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CONTENTS.

An Asterisk (*) denotes an illustrated article.

OFFICIAL NOTICES—

Twelfth Annual Meeting Western Gas Association..... 493

EDITORIALS—

Briefly Told..... 493

The Paper List for the Western's Conclave—A Theme for the Funny Men of the New York Press—The Echoes of Opposition Charters—Notes.

Coke as "Earth" for Lightning Conductors..... 494

Results at Ironton (O.) in the Working of an Improved Furnace, by Mr. W. W. Prichard..... 495

To what Extent are the Advantages Claimed for Separate Sections of Hydraulic Main Realized in Practice? by Mr. J. J. Jervis..... 495

Rustless Iron..... 497

*The Millis Method of Testing Arc Lamps for Candle Power..... 498

Pressure Problems, by Mr. Norton H. Humphrys..... 500

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 501

Personal—The Manager of the Bay Shore (L. I.) Gas Company—To Supply Electricity at Amherst, Mass.—Annual Meeting, Peoples Company, Chicago—Anent the Purchase of the Rochester (N. Y.) Company—A Legal Battle, San Francisco, Cal.—Organization at Portland (Me.) of the New York Metal Company—"T. A. J." on the Sutherland System—The Reduced Rates at Mansfield, O.—Annual Report, Montreal Company—An Ohio Bill—Canton (Mass.) may have a Lighting Company—Goodrich vs The Wallingford (Conn.) Company—Will Shanahan have to Pay?—Presentation to Mr. Gerdenier—Odd Letters that Come to Hand—Sale at Auction of the Cottage City (Mass.) Works—Death of Geo. H. Wood, Boston—Annual Election, Newburgh, N. Y.—And Many Other Items.

Commercial Anthracenes..... 504

Method of Hollow Building..... 504

The Market for Gas Securities..... 505

[OFFICIAL NOTICE.]

Twelfth Annual Meeting Western Gas Association.

SECRETARY'S OFFICE, WESTERN GAS ASSOCIATION, QUINCY, ILLS., April 8, 1889.

The Western Gas Association's Twelfth Annual Meeting will be held at Cincinnati, Ohio, on the 15th, 16th and 17th days of May. The "Grand" which has been secured by the local Committee of Arrangements for our headquarters, has been lately refitted, as well as greatly improved in all respects since the new management has assumed charge, and is now one of the finest hotels in the country. A reduction from the regular hotel rates, due announcement of which will be made later on, has been obtained for members.

A reduction in transportation rates has also been secured, for those who will be in attendance, in the territory of the Central Traffic Association, which is bounded on the East by Pittsburgh, Buffalo and Toronto; on the North by the line of, and including points on the Grand Trunk Railway, from Toronto to Port Huron, thence via Lakes Huron and Michigan to the North line of Cook County, Illinois; on the West, by the West line of Cook County and the Illinois and Mississippi rivers to Cairo, including Burlington, Keokuk, Quincy, Hannibal and St. Louis; and on the South by the Ohio river. Not later than two weeks before the date of our meeting, the Secretary will mail to every member (and to those who will kindly inform him of their intention of joining our Association) the necessary information as to how the reduction in railway fares can be obtained.

In accordance with the intimation contained in the preliminary notice published in the last issue of the JOURNAL, I am gratified to be in position, owing to the courtesy and promptness with which the contributors of papers have responded to my appeal for the titles of their papers, to present the following index to the literary treat that is in store for the members. The list is appended:

"Meter Accounting: Do I lose any Meters?" by G. A. Hyde, Jr.

"On the Use of Crude Oil for Firing Bench Furnaces and Enriching Coal Gas," by J. H. Woodmansee.

"Incandescent Gas Lighting," by John McIlhenny.

"Inclined Retorts," by R. D. Walsh.

"Retort House Work," by Geo. T. Thompson.

"Retort Furnaces for Burning Coal," by K. M. Mitchell.

"Fuel Gas," by Chas. R. Faben, Jr.

In addition to the above alluring array of subjects, our gifted Henorary Member, Prof. T. C. Mendenhall, of Terre Haute, Ind., has kindly consented to favor us with a lecture on the "Nature of Light." As the members of our Association ardently desire to absorb all the information that there is to be had on this very subject, it is safe to promise the genial Professor an attentive audience. A. W. LITTLETON, Secretary.

BRIEFLY TOLD.

THE PAPER LIST FOR THE WESTERN'S CONCLAVE.—The Assignment Committee and Secretary Littleton, not forgetting the energetic gentleman who fills the position of Chief Executive to the Association, are to be most heartily congratulated over the results of their labors in the mat-

ter of providing a list of victims who are to offer sacrifice before the altar of duty in the form of preparing papers for the enlightenment and delectation of the devotees who will assemble in force next May at the "Grand," to commemorate the 12th natal day of the Western Association. On first glancing over the Secretary's manuscript, our first thought was to attempt to recall the names of the gentlemen who comprise the Assignment Committee, but failing to recall them, we took refuge, first, in the reflection that they must have some particularly persuasive pleaders amongst them; for was not Mr. Jno. McIlhenny to present a paper. However, second thought soon showed to us that there was little cause for surprise—and pleasurable surprise, too—in his acceptance of the Committee's fiat, since he never shirks when duty summons. Such men preach allegiance; and they also practice it. Perhaps the Committee had a harder task in the cases of Messrs. Faben and Walsh, who have been in the breach before; yet their final acquiesence in the demand only all the more accentuates the fact that the Western member adheres every time to the McIlhenny type of preaching and practice.

Taken as a whole, the list promises great things for a most enjoyable reunion, the rounding-out contribution from Professor Mendenhall being in line with complete harmony. The number of contributions, too, seems to us to be in nice accord with the hours that can be devoted to the discussion of the subjects presented. Figure on it as you may, only 60 minutes can be found to the hour; and to our opinion, 7 distinct subjects can be much more fruitfully discussed in a 2-day business session than were it attempted to dispose of double the number in a like space of time. Something must be slighted if quantity is to be the primal object.

With the certainty, then, that the paper list is ample, and that time will not pinch, and with no lack of advance notification of that which is to come up, the Western's members should now prepare themselves for the verbal fray. Look up the records, re examine your experience books to the end that you may be better fortified after the "Grand" gathering on matters connected with the subjects of which any or all of these promised papers will treat.

Of the subjects chosen, all are prominent; but possibly the McIlhenny, Faben and Walsh topics will share the honor of attracting the greatest interest. And in respect to the two first mentioned topics we can rest content that nothing other than unbiased and uncolored opinion will be given. Neither patent rights, paid attorneyship nor other warp will interfere with the material that these gentlemen shall give to the Society in respect to "Incandescent Gas Lighting" and "Fuel Gas." In connection with the latter, and in consonance with the drift of present opinion, which seems to be all in favor of the "closed vessel" type of apparatus for the generation of fuel gas, the inclined retort system may eventually figure as an important factor. In any event, the latter subject is in good hands, for Mr. Walsh can speak intelligently to it, if any one in America can, since he has had the advantage at St. Louis of prolonged practical working with inclined carbonizing vessels. Mr. Hyde, Jr., will treat upon a matter that in any event has the charm of novelty; in fact, we do not recall an instance in this country or Europe where that particular phase of the meter problem was grappled with. That he can treat his subject understandingly is assured, if for no other reason than that he traces back to the man from Cleveland; but good as that reason would be, we have still a more convincing one in the success that has attended his management of the East Saginaw (Mich.) works. Mr. Thompson, of St. Louis, having chosen a title that is too general to infer therefrom what particular portion of retort house work he shall dissect, we can only venture the prediction that what he shall say thereon will be well said. Messrs. Mitchell and Woodmansee are new contestants in the paper field; and as such they are entitled to credit for honoring with acquiescence the call of their fellows. Spurred on by such incentive, success must attend their efforts—particularly when it is recalled that each is to deal with practice instead of to extend a theory.

In any event, thanks to the alertness of the Executives and the willingness of the rank and file, the Cincinnati meeting cannot fail of being a brilliant reunion.

Our reference to the subject of Mr. Hyde's paper brings to mind a cause for the publication in several of our New York dailies of alleged witicisms over the fact that one of them managed recently to get hold of a certain transaction between the Consolidated Company and one of its consumers. As frequently happens, a consumer's meter (this time the meter was in the premises of a shopkeeper named Poujoul, at No. 907 Broadway) which had been complained of had been replaced and the old one retested. The test showed the old instrument to be fast, and $14.62 was subsequently refunded to Poujoul on account of overcharge for gas. It is this that is occupying the presumed witty members of the staffs of our daily contemporaries, and Mr. Dana's organ seems to lead them all in the assininity of its comments thereon. The Poujoul instance, however, becomes a striking example only because he (we believe he is a hair dresser, with a leaning towards literature) made it public, whereas a similar case happens at least once a week. The really rare bird, however, would be the consumer who, having knowledge that his meter was slow, paid the Company for gas that he consumed but which was not registered. There are 20 slow meters in this city to the one that is fast; and if the Metropolitan organs wish proof thereof let them apply to the local gas meter inspector. As for a city consumer ever refunding money for unregistered gas—well!

The Echoes of Opposition Charters.—The present year ought to be prominent in gas history as the year of "gas deals completed," even though the causes that led thereto are to be traced back to other days. First came the completion of the Boston purchase, the same hinging directly on the famous actions of the Aldermanic Boards of 1884–5; next is the purchase by a syndicate of the Laclede Company, of St. Louis, the indirect result of the opposition charter granted years ago to Philadelphia parties; next in line we have the purchase of the Troy (N. Y.) Company, because of the existence of the Lowe fuel gas ordinance; on the heels of this, or shortly before it, is heralded the announcement of the purchase of the old Rochester Company, made possible by the existence of the erstwhile Municipal Company's charter; and most striking of all is the surrender by the Cleveland (Ohio) Company of its valuable franchises and property to the parties who had been so soundly defeated in all their attempts to engineer an opposition gas ordinance through the Council. In all these transfers it is not the large shareholders who suffer. The holder of less than 200 shares is the one who has to bear the brunt of it; for the big fish can possibly place his money profitably, whereas the minnow is helpless. The most surprising part of these bargains is contained in the fact that these properties are seemingly more valuable to shrewd outsiders than to those who have held them for years—possibly at a time when the outlook was other than promising.

The Waterhouse arc type of plant recently installed by the Grass Valley (Cal.) Gas and Electric Light Company, having capacity to sustain 70 high power arcs, is now in operation with satisfaction to the proprietors. The Company also supplies incandescent lights of the Bernstein type.

An explosion at the works of the Tarrytown and Irvington (N. Y.) Gas Light Company was reported last Wednesday. While no damage of moment to property occurred, we regret to say that Superintendent Cole received injuries of a painful nature.

The Erie (Pa.) Welsbach Company has been chartered, with a capital of $100,000.

The Lafayette (Ind.) Brush Electric Light Company is in the hands of a receiver, because of a default in interest payment on $26,000 of bonds.

The Brattleboro (Vt.) Gas Company will put up another gasholder, on a plot recently purchased for the purpose, not far from the Hinsdale bridge.

Coke as "Earth" for Lightning Conductors.

The London *Journal* "notes" that the advantages of coke as facilitating the connection to earth of the bottom ends of lightning conductors, have been recognized by the Italian Ministry of War. According to a recent order, the lower ends of lightning conductors fixed to Italian military buildings must be connected to a sheet of lead more than 2 millimeters thick and 1 square meter superficial area, or to a cylindrical cage formed of iron bars filled with coke and surrounded with a sheet of metal. Signor Baretta has invented a new "earth" for lightning rods composed of a corrugated sheet of iron or copper forming a cylinder of 0.80 meter diameter and height. All the corrugations are studded with points inside and out, and the free edges of the sheet are cut into saw teeth. In this way a large surface of contact with the soil is ensured, with consequent rapid discharge of electricity. When the subsoil is dry and rocky the inventor digs a trench 1.5 meters deep, placing a layer of broken coke in the bottom, upon which a corrugated sheet is laid. More coke is placed upon this sheet, and then a second sheet is put down in electrical connection with the first. A third layer of coke is placed over all; and the soil is then rammed into the rest of the space available to the ground line. The coke holds the damp and makes a safe "earth."

Results at Ironton (O.) in the Working of an Improved Furnace.

By Mr. W. W. Prichard.

On October 12, 1886, we fired up our new style bench of four retorts—15 in. by 26 in., by 8 ft. 6 in.—the furnace being 14 in. wide, and 42 in. from top of bearing bars to bottom of lower retorts; the furnace flues running from the back of arch under lower retorts to front, thence down and back to chimney. From the front run the air flues, under the lower furnace flues, back 8 feet, thence over and up, where air is distributed through flues, about 6 in. apart, along the top of the furnace fire. We suspended a three-quarter pipe from the bearing bars along the sides and across the back, with holes about 3.32 in. in diameter, drilled about 8 ft. apart, through which steam passes.

At the time of firing this bench we were running a bench of 5's, which for 6 months had shown an average yield of 4.46 cubic feet of gas to the pound of best lump Youghiogheny coal. During November the yield ran up to 4.59; up to 4.73 in January, and down to 4.21 in February. During the first five days of March the two benches showed an average yield of 4.256; but when the bench of 5's was dropped, the balance of March, the bench of 4's showed an average yield of 4.907.

In the next 4 months the bench was charged 577 times, equal to 2,308 retorts, with 516,800 pounds of coal, which yielded 2,639,140 cubic feet of gas—or an average of 223.916 pounds of coal, with an average of 1143.47 cubic feet to the charge in each retort, or 5.106 cubic feet to the pound of coal.

In June, July and August, 1888, after the bench had been in use twenty months, it was charged 353½ times, equal to 1,414 retorts, using 351,500 pounds of coal, or 248.578 pounds to retort, making 1,716,670 cubic feet of gas, or 1214.12 cubic feet to retort and 4.883 cubic feet to pound of coal. The coal used was Kanawha soft that was really fine enough to be called slack.

With the old or shallow furnace the bench would chill when carbonizing this coal, if run on four-hour charges, whereas with the deep furnace our men hunt out the slack for charging into the top retorts in order to keep the heat down.

We have had no trouble to keep up our heats; indeed the greatest difficulty, especially at first, has been to keep the heats down. This heat melted the top of the arch so that it came down on the upper retorts, actually reversing the upper part of arch. This bench required clinkering only once in four to six weeks; the stokers taking a bar with a wide, flat point, which they call a "spud," to rake the ashes out once on a turn of twelve hours. The furnace was fired about every two hours. There is a great saving of labor in these two items—the new furnace being clinkered once in, say, four weeks (although not so often) while the shallow furnace would have to be clinkered 112 times; again, the new furnace was fired 12 times in 24 hours, and the old 48 times. I never weighed the coke to ascertain just how much coke was used; but the stokers claim that the coke from one retort kept it going when in regular work, which would be 25 per cent. A bench of 3's next to it required the coke from two of its retorts, for a shallow furnace, or 66⅔ per cent.

On March 1st, 1884, a bench of 4's, old style, shallow furnace, same size retorts in the same arch, and attached to the same chimney flue, was fired; this bench was considered by the men a number one bench. I will designate the new deep furnace as new, and the old shallow furnace as old in the following comparison of the two:

	Days in Operation.	Times Charged.	Equal to Retorts.	Coal used pounds.	Av. Charge to Retort.	Av. Yield to lb. Coal.	Av. Am't to Retort.	Am't Gas. Made.
New....	775	3,675	14,700	3,268,850	222.37	4.67146	1032.26	15,280,630
Old.....	771	3,327	13,308	2,381,530	178.95	4.22959	756.90	10,072,910
Gain....	4	348	1,392	887,320	43.42	.44187	275.36	5,207,720

The following is a comparison with a bench of 5's, same size arch; retorts one foot longer, but made smaller, to get them in about 12 in. by 24 in. by 9 ft. 6 in.

	Days in Operation.	Times Charged.	Equal to Retorts.	Coal used pounds.	Av. Charge to Retort.	Av. Yield to lb. Coal.	Av. Am't to Retort.	Am't Gas. Made.
New....	775	3,675	14,700	3,268,850	222.37	4.67146	1032.26	15,280,630
Shallow.	503	2,127	10,635	1,678,245	157.80	4.43858	700.50	7,449,030
Gain....	272	1,548	4,065	1,590,605	64.57	.23288	331.76	7,831,600

This bench of 5's is the one mentioned in the first of this paper, and is credited with a good deal of gas actually made by the bench of 4's. The only way I could estimate the amount made by each bench was to take amount of coal each bench used and multiply by the average yield per pound of coal.

In December, 1885, it took this bench of 5's, the old 4's here mentioneed and a bench of 3's, or 12 retorts with shallow furnaces, to make 1,028,270 cu. ft. In December, 1886, this bench of 5's, with the new 4's, or 9 retorts, made 1,145,690 cubic feet; December, 1887, two new style benches, 4's, or 8 retorts, made 1,223,550 cubic feet, and with lower retorts idle a good deal then. In December, 1888 (the city having changed street lamps from Philadelphia schedule to midnight only), we used one of these benches of 4's which had been used 99 days the year before and then let down, and a bench of 3's, shallow furnace (over two years old), and had been used twice—three months at a time—and let down each time; so, with seven retorts we made 1,059,480 cu. ft., or 31,210 cu. ft. more than we made with 12 retorts in 1885.

A comparison of the labor of the two benches of 4's that were in the same arch, old and the new, is:

	Days in use.	Times Clinkered.	Shaking out out Ashes.	Times Firing.
Old.....	775	3,084	37,008	37,008
New.....	779	22	1,550	9,300
Gain.....		3,062	35,458	27,708

To what Extent are the Advantages Claimed for Separate Sections of Hydraulic Main Realized in Practice?

By Mr. J. J. Jervis.

[A paper (with subsequent discussion) read at the recent meeting of the Southwest of England Association of Gas Managers. Our reprint is from the London *Journal*.]

When I undertook to write a short paper on the above subject, I was perfectly aware I was unable to do so from my own experience; but I thought I could get ample information from the managers of gas works where sectional hydraulics are in use. I find, however, that either very few works have at present adopted the practice, or the managers do not altogether like to reply to an inquiry. Perhaps had I visited the several works, instead of writing, I should have gathered more information; and I admit that it may certainly be troublesome for a busy man to sit down and answer a long string of questions. However, I received many kind replies, and sufficient information to say something on the subject; and if thereby a text be furnished for discussion, I shall not have made the mistake I was afraid I had, when I read in one reply—"Is it not rather difficult and somewhat unusual to write a paper on a subject in which the writer has had no special experience? But perhaps your Association is testing some new method for the production of good discussion."

I wrote to the managers of a great many works, large and small, and all outside our Association, as I did not wish to deprive any member present from giving us the benefit of his experience. I asked for information under the following questions: (1) Do you find in the separate system a remedy for choked ascensions? (2) How often are the contents of the hydraulic run out? (3) Do you work without a seal, or how much? (4) Do you find less carbon deposit? (5) Had you, before introducing the system, ever been seriously inconvenienced by requiring isolation of any particular bed of retorts?

From the replies which came to hand I learn that, in the matter of chokes as caused by the hydraulic, there are still divers opinions. Two or three managers could not, as the result of their experience, say that the separate system either lessened, or was a remedy for "chokes," as they had not known stopped ascensions for ten, twelve and fifteen years, in which periods they had tried both systems. One gentleman replied to the effect that separate sections facilitated the cleaning out of the mains; and although they did not do away entirely with stoppages, these were certainly lessened in number. But several other managers said they found no benefit whatever from them in this respect. Therefore, although the separate system allows of frequent cleansing of the hydraulic, it seems pretty clear that the cause of stoppages is not entirely due to the long main and thick tar, and that the decrease of the number of stopped pipes by the use of separate sections may be due to other existing conditions, rather than to the periodical cleansing of the hydraulic; for some managers who run out the contents of the main either partially or wholly every day, state that chokes occur as formerly. Two of those who replied admitted that, although they had the separate system in use, they only run off the contents of the mains once or twice a year. Of course, they cannot complain if they find stopped ascensions are not less frequent. One manager said he flushes out the hydraulic every few days with cold ammoniacal liquor; another, with warm. One, some-

times allowed the contents to run clear out; and then let the main fill up with tar and liquor as made—working all the time without seal.

As a rule, however, all the replies I received show that users of the separate system do not work with less seal than those who have long lengths of main; although, by frequent flushing and running out, they have a cleaner liquid in the hydraulic. But, as before noted, that does not appear to diminish the carbon deposit to any great extent, any more than it does stoppages. Those who had no stopped ascensions had (in my opinion, from the same cause) little or no carbon; and this is not on account of anything in the hydraulic or seal, but because of something special in the heats or coal; or perhaps from another reason which will be alluded to further on. The manager who works sometimes without a seal at all, running his exhauster just on the balance, does not find the deposit of carbon less; and, from the answers as a whole, I gather that, although the separate system facilitates a lighter dip, and in some cases no dip at all, it does not any more than the various anti-dips in use remove sufficient pressure to occasion any appreciable diminution of carbon deposit. At one or two works from which I have received information, the hydraulic is divided by diaphragms between the flanges of each section, with a gas passage at the top of the plate, and arranged so that the contents of any portion can be run off, either partially or wholly—the tar being taken off first. This plan is not so costly and complicated as the absolutely separate main system; but it has not the advantage of the extra gas exits.

The answers to my last question were better in accord with each other, and showed a more clearly defined reason for adopting the use of sectional hydraulics. It does not appear that the system has been introduced because any inconvenience has arisen, requiring isolation of any particular bed of retorts, from accident or otherwise; nor as a decided and unfailing means of preventing chokes or carbon deposits; but as a remedy against the unequal sealing that takes place in long lengths of hydraulic supported in the orthodox fashion—on standards or crutches on the ever-shifting brickwork of the retort stack. One engineer observes that "care in building the arches, and in supporting the hydraulic main, does a great deal to remedy the inconvenience that gives rise to such isolation." Another says that "the great advantage of the division is that you are able to keep a regular dip with the several adjustable overflow valves." Another affirms that "now he has no trouble with the seals as formerly." And, in the same strain, another adds that having suffered much by the expansion and contraction in the slack, causing breakage of joints, leakage, etc., and unequal seal, he often desired the sectional arrangement, as at once preventing such occurrences. One answer gives what appears to me to be the main advantage of the divided hydraulic, though perhaps not the recognized reason why some have adopted it. The writer, an engineer of a very large works, says: "I have never thought it necessary to carry the separate system out to the extreme extent to which it is carried by some engineers; but I have generally taken the gas off at many different places, or, roughly speaking, one lead-off pipe for every ten or twelve retorts." Now, taking the gas off at many different places may be the secret after all of not so many chokes and less carbon with a divided hydraulic. An esteemed member of this Association maintains that ample exit for the gas will diminish stoppages; for, in the discussion on the question at our meeting last March, at Trowbridge, he remarked that "it was all very well to talk about large ascension pipes; but this was not going far enough. There must be large exits from the hydraulic. With some free working coals, the gas came off with great rapidity at first; and there should be nothing to hinder it from passing away. He found the coal had nothing to do with it; and the cause was certainly not high heats. The simple fact was that the outlet from the hydraulic was too small; and when this was set right, there were no choked pipes." The extreme sectional hydraulic gives a "take-off" both for gas and liquor to each bed of retorts; but it may be questionable if the division need be so great. As to adopting the separate system because of the unequal standing of the main on the retort-stack, I prefer the placing of it on columns, and altogether independent of the brickwork.

In conclusion, I hope I have furnished text for some discussion; and then I shall be satisfied I have not made a mistake in writing a short paper on a subject in which I have had no special experience.

Discussion.

Mr. R. Beynon (Torquay) said he had lately tried dividing the hydraulic main into short sections. When he first went to Torquay there were three benches of retorts, and one length of hydraulic to each bench. Owing to expansion and contraction of the brickwork when lighting up or letting down at different parts of the bench, the seal would vary from 1½ inches at one part to 4 inches at another; and choked ascension pipes were a frequent occurrence. In the summer he took the top plate off the hydraulics, fitted a diaphragm plate between each flange, and arranged a separate outlet for each section. This arrangement proved serviceable in reducing the stoppages in the ascension pipes, and also the deposit of carbon in the retorts. The carbon, which formerly accumulated in great blocks at the back ends, was now more evenly diffused throughout the retort, and formed much less rapidly. The plan of separate sections had, therefore, proved a great relief to him.

Mr. S. W. Durkin (Southampton) remarked that he had not hitherto tried short lengths of hydraulic; and in one of his retort houses there was one length for every eight benches. As a matter of experiment, he had lately fitted up in one house, in addition to the outlets, of which there was one at each end, wrought iron 2-inch outlets at frequent intervals, so as to take the gas off rapidly, and without passing along any very great extent of main. In another house there was one length of hydraulic to every four benches, fitted with an outlet at each end; and he had as much trouble from choked pipes with this arrangement as in the house where the longer length of main was used. He was, therefore, unable to speak from experience as to the benefit of dividing the hydraulic, though, under some circumstances, such a plan might be advantageous. The long lengths of hydraulic required levelling occasionally, or else the anti-dip system might obtain without the apparatus. He periodically had this carefully attended to, propping up the main when necessary. In speaking of choked pipes, he thought it was desirable to specify whether the ascensions or the bridge pipes were the parts referred to, as there was some difference in the nature of the deposit, which was usually harder and more pitchy in the ascension pipe. Indeed, he had seen it so hard that the pipes were split by the "jumper."

Mr. W. A. Padfield (Exeter) said he had both long and short lengths of hydraulic at his works. At one part of the carbonizing system, there was one section of hydraulic to each bench, fitted with a separate outlet leading to a foul m ain common to all. Formerly, he experienced great trouble from choked pipes; but since adopting this plan he only had one occasionally. Another advantage was that the exhaust could be increased a little; and this, he thought, had been the means of reducing the carbon deposit on the retorts. Whatever the amount of exhaust, however, that was not everything, though the freer the exit for the gas, the better. In regard to the long lengths of hydraulic, there was rather more carbon in the retorts, because of the variable depth of tar in the main; and this meant variation in back pressure. But if the level of the long lengths was carefully attended to, he obtained as good results as with short lengths. One advantage in connection with the latter that might not at first sight appear, was that the exhauster was working on only the number of dip pipes that were actually in use; and therefore the risk of drawing air was done away with.

Mr. H. Sainsbury (Trowbridge) said that at one time he had a row of eight beds of retorts with one length of hydraulic for the whole; and he experienced considerable difficulty on account of the variations in the level producing unequal dips, to which allusion had already been made. But he had gradually been arranging the beds in shorter sections; and now had four lengths of hydraulic main to thirteen beds of retorts, fitted with tar valves to take off the tar as fast as it was formed. The result was that he could decrease the seal, and keep up a good exhaust; and yet he scarcely ever heard air drawing in through the dip when a retort was slacked off. His experience showed that it was possible to work with more certainty with the short lengths of hydraulic.

Mr. J. Lowe (Weymouth) remarked that he had used separate sections of hydraulic to each bed of retorts for some time, but could not say that he had realized all the advantages claimed for the plan. The greatest benefit, in his experience, was the facility afforded for cleaning the hydraulics or removing the dips, without interfering with regular operations. He had large outlets, 6 inches in diameter, for each section; but he did not think that went for much. During his recent illness, his nephew and late foreman were much troubled with choked ascensions and bridge pipes, which he found usually went together. He used beds of sixes; and it was only with the two top retorts in each setting that the trouble arose. They hit upon the simple expedient of increasing the length of the ascension pipes to those retorts, to the extent of 3 feet; and this proved a complete cure. He considered that the nature of the coal used had more to do with trouble from chokes and stoppages than anything else.

Mr. H. G. Crowe (Wellington) said he was sure there was some advantage in having a separate section of hydraulic to each bed of retorts in small works. The advantage was especially apparent when only a comparatively small number of the whole were in use, as the exhauster was only acting upon the dip pipes that were actually at work, and there was no chance of drawing air. He could keep up a nicely regulated

dip; and the men liked the arrangement. At Wellington there were five beds of retorts; and it was never necessary to keep them all going at one time. When there was one length of hydraulic for the five beds, it was difficult to preserve an exact level; and, indeed, the expansion of the brickwork on one occasion was sufficient to cause a fracture of the hydraulic, which might have led to a serious mishap.

The President thought that scarcely any two speakers agreed upon some decisive advantage that might be secured by dividing the hydraulic main into sections—one for each bed. But there was no question that the consequences of a deviation—say, of an inch—in the hydraulic seal were of sufficient importance to render it advisable to obviate it if possible. He had experienced a difference of this kind on a length of hydraulic that served for five beds of fours. The seal was ½ inch at one end, and gradually increased to 1½ inches at the other; and he had known the joints to open when lighting up at one end. As to stopped pipes, he used coal that did not admit of very high heats, and scarcely knew what a stoppage in the ascension pipes was; but he had found a considerable amount of tar in the H pipes. He gathered that there was a difference of opinion as to the advantages to be secured by separate sections of hydraulics; and some thought that they could be obtained, in a great measure, by careful attention to the working. The plan certainly involved some outlay. Outlets for the gas at frequent intervals prevented all the gas from travelling in the same direction, and did not admit of its remaining so long in the hydraulic; but, though more valves might be required, they need not be so large. A valve for a single bed need not be so large as one for (say) three beds. It seemed to be understood that the freer the gas could pass off, the less would be the formation of carbon in the retort; and therefore it might prove advantageous to fix several gas outlets on a long bench of hydraulic. But if anything at all was done, it would be better to have separate sections of hydraulic to each bed. On long lengths of hydraulic, there was certainly a liability to strain and fracture; and uniformity of seal was an important point, as was also the confining of the exhauster action to the beds actually in use.

Rustless Iron.

An English correspondent (whose facts are largely borrowed from an account in the London *Builder*) writes that a short time since a party of architects and experts were invited to see a large heat of iron pipes subjected to the Bower-Barff process of coating with magnetic oxide. One remembers very well indeed the great interest which was excited some twenty years ago by the invention of the late Professor Barff, and the display at the Royal Society and at other learned Societies of gratings, tubes, brackets and a variety of other articles, including swords and gun barrels, and other highly polished articles. From that day to this one has never ceased to hear of Barff's process, but apparently the rustless wares and goods have not come into such extensive and everyday use as might have been expected. In fact the special display in question may be taken as a reminder to a very practical profession that there is ample scope for a very much wider recognition of the Barff process in architectural and building specifications. The works at Skin Market-place, on the Bankside of the Thames, by Southwark Bridge, are small but very interesting, as containing, first, the original Barff apparatus, and, secondly, the more complete and satisfactory Bower modification.

The process itself is very simple and based on almost elementary principles. The iron goods are heated to glowing redness, and then a continuous current of superheated steam is allowed to play upon the radiant mass. Oxygen from the steam is absorbed by the heated iron wares, and a double oxide is formed superficially, and penetrates in depth into the mass of the metal, according to the length of time the action is allowed to go on. Generally in practice this permeation is kept within the limit of the $\frac{1}{32}$ of an inch, and the time of operation under 12 hours. The term "rustless" is thus seen to be in one sense a misnomer, for the iron is really double rusted to the extent that it cannot rust any more when so coated. Exposed to the ordinary wettings and dryings and weather action, articles such as gutter gratings, rain water pipes and railings, endure for a very long time before they undergo the slightest change or reduction of condition. It is still possible after severe attack, continued for very considerable periods, that the peroxide should begin to be robbed of one particle of its oxygen, and be reduced, spot by spot, to the condition of the common red rust, or single oxide. It is, however, correct in a general sense to call the wares so produced "rustless," because the process is undoubtedly a preservative whose influence is very slow indeed in giving way, and the Bower-Barff process will compare in efficacy very favorably with paints and lacquers.

The practical value of the process, indeed, over the ordinary paint coatings may be well illustrated in the matter of the down rain pipes from roof to ground. For repainting these, long ladders and other paraphernalia are needed, and even then the workmen cannot well get at the rear of the pipes contiguous to the walls. Long lines of rust may consequently be almost universally observed in this vertical interspace, causing rapid decomposition of the pipes. For pipes which had been submitted to the Barff process there would be no more deterioration on the one side than the other; whilst for years there would be no need of repair. If any such need arose the pipes could be taken down and re-processed.

The limitations of the time and of the extent to which the process shall extend have for their object the prevention of any sensible decrease in the strength of the iron goods. The superficial protection is all that is really required, and the extent of its permeation need be no more than will suffice to avoid injury by external bruises. In experimental tests made by the late Sir Joseph Whitworth on some pipes of ordinary and processed metal, it was shown that under various pressures there was no appreciable difference up to 21 tons; with 22 tons load, before the process the deflection was 0.0002 of an inch; after the process, with 21 tons, it was 0.0008; with 23 tons before process, 0.0008: and with 22 tons afterwards, 0.0022 of an inch. By these tests, therefore, some approximate knowledge on that point can be clearly gathered.

In the original Barff apparatus the iron goods were placed within a large iron cylinder, heated on the outside, the heat radiating through the wall of the cylinder, and so bringing the goods within it to a bright red heat. Superheated steam was then admitted into the cylinder, and the process performed, the hydrogen liberated escaping by a pipe. In the Bower process the cylinder is abandoned, and there is substituted a large firebrick chamber. The furnaces are built in separate compartments, about 8 ft. high by 4 ft. broad, and these are fed with coal from above, a small draught being admitted below to the extent sufficient for gas to be continually generated. This gas is admitted in a continuous stream into the heating chamber, where it is met by a corresponding current of air, which has worked its way from the outside atmosphere by numerous pipes descending into the earth and rising again underneath the hot chamber in such a way as to get well heated in its passage. The combustion of the air and gas is thus rendered perfect, and a fine glowing heat is maintained in the chamber.

The goods, placed on a long trolly on sixteen wheels, are run into this chamber, the ends of which are then closed up. After a time, when the goods are thoroughly hot, the gas fire is cut off, and the superheated steam current, generated in a separate boiler, is introduced and kept up for some hours, according to the nature of the work in hand. No special provision is made for the escape of the residual hydrogen from the steam, which gets away as best it can through the brick structure of the chamber and through the flue or chimney stack. Such furnaces can be easily managed, and may be erected in any provincial district and attended to by ordinary labor. There is, therefore, no difficulty either in the process itself or in the multiplication of small works for local operations by which the more expensive transport to any distant central station or works would be avoided. The cost is, perhaps, a little high, and this may be the chief reason of its hitherto limited adoption. As gilding, silvering and painting on a rustless surface has perfect adhesion, and will not flake away nor blister, there are many subsidiary advantages attached to the process which should cause the leading men in practical undertakings to give attention to it as having results which are really scientific and useful.

THE generating plant of the Keene (N. H.) Gas Works has been enlarged, relined and refitted.

AT a regular meeting of the Board of Trustees of the Sing Sing (N.Y.) Gas Manufacturing Company, the following resolutions were adopted:

"*Resolved*, That through the death of Mr. Charles F. Maurice we lose the faithful services of an officer of this Board, who has been for many years its able Secretary, and the efficient Manager of the Company's affairs; that we testify to the deep interest always manifested by the deceased in the welfare of this Company; to his patient industry in the performance of his official duties, and to his pleasing and courteous bearing towards the members of this Board.

"*Resolved*, That we extend this assurance of our warm sympathy to those whom this death has left in bereavement, and we commend to them that help and that consolation which can come only from Him who doeth all things wisely and well. GEO. J. FISHER, J. B. NOXON, J. HOWE ALLEN, } Committee."

The Millis Method of Testing Arc Lamps for Candle Power.

By Mr. John Millis.

We are indebted to Mr. S. McCormick, Superintendent of Lamps and Gas, Department of Public Works, New York city, for a copy of the report submitted to him by Mr. John Millis, in response to instructions received by the latter from the Superintendent to arrange for a test of the illuminating value of the arc lights supplied the city under contract. The method adopted for carrying out the tests is submitted without any abridgement, and is as follows:

The specifications of the contract under which lamps are furnished and operated for lighting the streets, parks, etc., contain the following clause:

"3. *Luminous Intensity.*—Each lamp must give a light equivalent to that of not less than 1,000 standard sperm candles, weighing one-sixth of a pound each and burning as near as possible 120 grains of spermaceti per hour. Measurement of the electric lamp shall be made by comparison with a standard gas, oil, or other lamp of at least 20-candle power, using the improved Bunsen photometer. The candle power of the standard lamp shall be determined by direct comparison with standard candles. The electric lamp shall be measured in a direction making an angle of 40 degrees with and below the horizontal plane, the axis of the carbons being vertical, with the positive carbon uppermost. After such observation the electric lamp shall be revolved 90 degrees about its vertical axis, in one direction only, and the mean of ten such observations shall be taken in determining the candle power. The measurements shall be made with the globe removed from the lamp and with the light of the arc unobstructed. All lamps to be furnished and operated under this contract are expressly required to give a steady and uniform light without undue flickering, hissing, or pumping. Each lamp must be operated at not less than 425 Watts in the arc, to be determined by the electrical measurement of the current and difference of potential between the carbons, using approved instruments properly tested and calibrated."

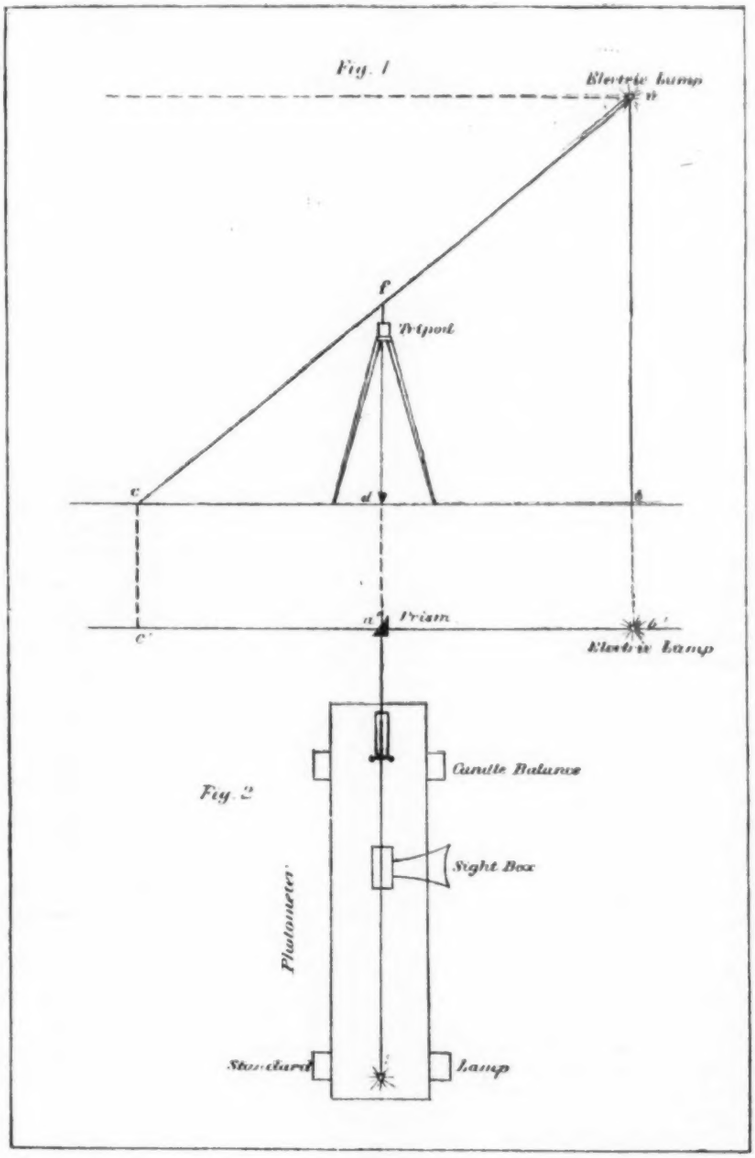

Plate I.

In order to make the tests of the public lamps in accordance with the above requirements a set of ammeters and voltmeters of the Ayrton and Perry pattern was procured, and a special form of Bunsen photometer was designed and constructed in accordance with the following specifications:

Photometer Bar.—To be in two parts, hinged at the middle so that it may be folded for transportation, dowel or other devices to be provided at the joint so that when opened for use the two parts will come together fair. To have two sets of graduation on each side; one set to be in inches and tenths, and to extend the full length of the bar; the other set to be for direct comparison of lights placed 100 inches apart, and to read ratio to one-tenth. This graduation to extend over half the bar only. Both graduations to be alike on both sides of the bar, and to be made in boxwood. The bar to be made of hard wood, and to be supported on two removable brass pillars, holes for which in both bar and table to have brass bushings.

Table.—To be not less than 1½ inches thick, with cleats to prevent warping. To be hinged at middle for folding, with device to hold table straight and rigid when opened. To have brass ring-socket to receive lamp base, and cleats for base of candle balance, so that when lamp and balance are placed on the table the lamp and candle flames will be in proper position. To have small brass hooks for plumb-lines, and to be painted dead black.

Supports for Table.—Two light wooden horses to be provided of such height that the center of the sight-box shall be five feet above the floor. Horses to be painted dead black.

Glass Prism and Tripod.—The holder for the reflecting prism to be supported in a brass tube to which three light hardwood folding legs are attached. Hook for plumb-line to be placed at lower end of the tube. Hooks to be provided to connect legs with lower end of tube, when legs are spread. The glass prism to be of best workmanship obtainable, to be totally reflecting, and the two faces at right angles to each other to be about two inches square. To be accurately mounted, permitting free motion about the vertical axis, the horizontal axis, and a third axis at right angles to the latter. The adjustment must be such that these three axes intersect in a single point which lies in the center of the back of the prism, and which point always remains fixed whatever adjustment is given to the prism. Clamp screws to be provided for each axis. A removable brass pin to be fitted in the holder, so that when substituted for the prism its point will correspond in position to the center of the back of the prism.

Sight-Box and Carriage.—Carriage to be alike on both sides, so that readings may be taken on either side of the bar. To have index so designed that readings may be taken on either graduation, and to be provided with two adjustable mirrors for illuminating the graduations. Sight box to be of general form shown on sketch, and to be so made as to permit the ready removal of the screen. Two screens to be provided, one for measuring the power of standard lamp and the other for comparing standard with electric lamp. The box to revolve about vertical axis, and to have clamp screw for holding in position.

Standard Lamp.—To be what is known as a "constant level mammoth student lamp," adapted to burn mineral oil. To be carefully made, and to be provided with a blackened metal screen having an opening so adjusted that only the "solid" or brightest part of the flame affects the screen in the sight-box, one dozen carefully selected chimneys, and a supply of wicks to accompany the lamp.

Candle Balance.—To be of the most approved pattern, adapted to weigh grains accurately, and to have sockets for two candles.

Miscellaneous.—There are also required for use with the apparatus the following articles: One stop-watch, a chalk-line and chalk, one 20-foot tape-line, one scratch-awl, one scissors, and one wooden square 2 by 3 feet.

Packing Arrangements, etc.—The photometer bar, table, and tripod to have straps and hooks to secure them when folded, and the photometer bar to have an oilcloth or other waterproof bag or case. A substantial wooden chest to contain all parts of the photometric and electric apparatus, except the bar, tables, horses, and tripod, to be furnished and to be provided with suitable lock and key.

The above specifications in connection with the drawing (Plate II.) will render the construction of the apparatus clear.

The measurements of the electric light are made in the following manner:

The electric lamp to be tested is supported at a convenient height above the floor, and in such a manner that it may be turned about its vertical axis. An ammeter is placed in circuit with the lamp, and a voltmeter is connected to the terminals. A plumb-line is suspended from the lamp frame directly under the "arc," and the point on the floor directly under the plumb-bob is marked with chalk. Through this point a chalk line *b c* (Fig. 1, Plate I.) is struck in a convenient direction, and on this line a distance *b c* equal to *a b* x ten 50° is laid off. A cord is then stretched from *c* to the point of contact *a* between the lamp carbons, which is of course the position of the arc when the lamp is burning, and the tripod with the brass point in the socket is set so that the point just touches the cord. Through the point *d* indicated by the point of the plumb-bob suspended under the tripod a chalk line *d' e* is struck at right angles to *b' c'* (Fig. 2). Over this line the photometer is set by the aid of the plumb-lines suspended underneath the table, the position being such that the whole distance *a f* x *d' e* from the electric lamp to the standard is some even number of inches, for convenience in making the computations.

The candle power of the standard lamp is first determined in the usual way by comparison with the standard candles. The candle balance is then removed, the prism placed in its support and adjusted so that the reflected beam of light from the electric lamp is parallel to the photometer bar, and the comparison between the electric lamp and the standard proceeded with.

The readings are now taken on that portion of the bar graduated in inches and tenths, the zero being at the standard. It is not found to be practicable to have the bar graduated for a fixed distance between the electric lamp and the standard, since it is not always convenient to set up the apparatus so that this distance shall be the same. After each set of readings on the photometer the ammeter and voltmeter are read, the electric lamp turned 90 degrees about its vertical axis, and the observations repeated. Half of each set of photometer readings is taken on one side of the bar and half on the other.

Since the readings taken when measuring the electric lamp are inches and tenths, the relative intensities of the lamp and the standard is determined by taking the mean of these readings and applying the well-known law of the square of the distances from the lamps to the screen. A correction for the absorption of light by the prism is afterward applied, the amount of this absorption being determined experimentally.

At the conclusion of the observations with the electric lamp the candle power of the standard lamp is again determined, and the mean of the two determinations is used in computing the candle power of the electric lamp.

The apparatus must of course be used in a room where other lights can be extinguished, or screens must be so arranged as to keep all light, except that of the lamps or candles used in the test from affecting the screen, and strong drafts which affect the oil lamp and candles must be provided against.

Photometric Apparatus adapted for testing Arc Electric Lights

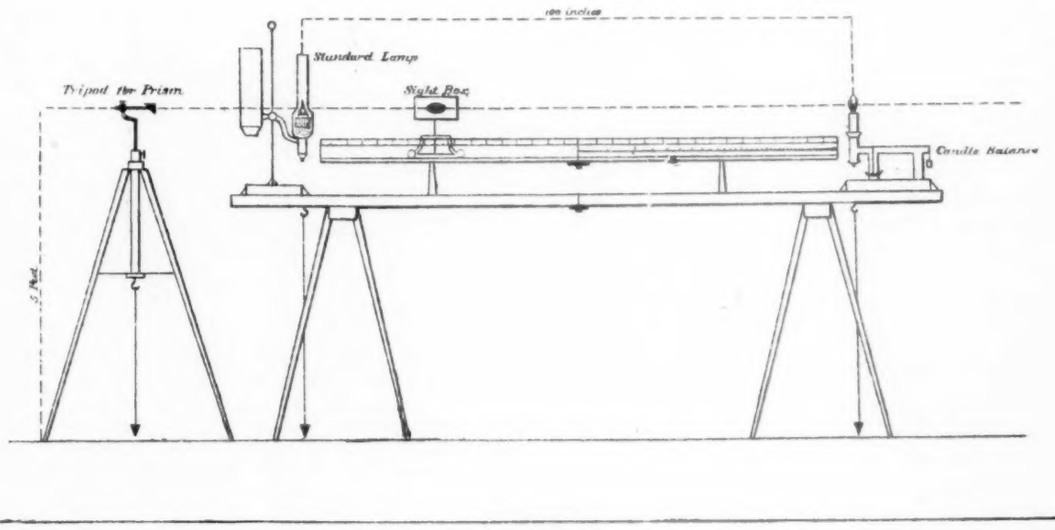

Plate II.

As a further illustration of the methods of measurement, the following details of two sets of observations are given:

"Brush" Lamp.

Candle power of standard lamp, first measurement, 28.308.

	Ammeter.	Voltmeter.
	9.9	45.0
	9.7	45.0
	9.6	46.5
	9.7	46.5
	9.65	47.3
Sum....	48.55	230.3
Mean ...	9.71 amperes.	46.06 volts.

Readings on photometer comparing electric lamp with standard lamp.

First.	Second.	Third.	Fourth.
31.5	31.6	29.9	31.1
30.7	31.3	31.0	31.0
31.7	31.0	30.8	31.8
31.2	31.3	30.7	31.0
31.2	30.1	30.8	31.5

Readings of Photometer, continued—

First.	Second.	Third.	Fourth.
30.8	31.3	31.7	31.3
32.0	32.4	31.0	31.6
31.3	32.0	30.5	31.9
31.4	32.4	30.5	31.7
31.5	32.3	29.4	32.3
Mean.. 31.33	31.57	30.63	31.52

31.33
31.57
30.63
31.52

4)125.05

31.2625 Grand mean.

Distance between the electric lamp and standard lamp, 242 inches.
242 — 31.2625 = 210.7.
$(210.7)^2$

$(31.3)^2 = 45.314$ = ratio of electric lamp to standard.

Candle power of standard lamp—

2d measurement.....	28.545
1st "	28.308
Mean.....	28.426
Correction factor of prism.	1.191

28.426 × 45.314 × 1.192 = 1535.41 mean candle power of electric lamp measured 40° below horizontal plane.
9.71 (amperes) × 46.06 (volts) = 447.24 mean Watts in lamp.

"Jenney" Lamp.

Candle power of standard lamp, first measurement, 21.062.

	Ammeter.*	Voltmeter.
	....	33.5
	....	32.5
	....	31.5
	....	34.5
	....	34.3
Sum....	....	166.3
Mean...	22 amperes.	33.26 volts.

* The ammeter had not sufficient range to measure the current. Upon the statement of the Superintendent of the Station the current was assumed at 22 amperes.

Readings on photometer comparing electric lamp with standard lamp:

First.	Second.	Third.	Fourth.
34.7	29.9	33.0	26.7
34.0	30.5	35.4	26.7
32.2	26.7	33.9	25.1
32.3	28.7	34.7	24.7
31.6	28.7	32.2	25.0
30.0	27.1	31.9	24.7
32.6	25.7	30.3	24.3
33.2	28.8	29.7	25.5
29.0	28.3	26.8	25.0
37.3	26.0	32.3	25.3
32.69	28.04	32.02	25.30

32.69
28.04
32.02
25.30

4)118.05

29.5125 Grand mean.

Distance between electric lamp and standard, 244.56 inches
244.56 — 29.51 = 215.05.
$(215.05)^2$

$(29.51)^2 = 53.105$ = ratio of electric lamp to standard.

Candle power of standard lamp—

2d measurement.....	22.297
1st "	21.062
Mean.....	21.679
Correction factor of prism.	1.192

21.679 × 53.105 × 1.192 = 1372.3 mean candle power of electric lamp measured 40° below the horizontal plane.
22 (amperes) × 33.26 (volts) = 731.72 mean Watts in lamp.

Pressure Problems.

Communicated by NORTON H. HUMPHRYS, F.C.S., to the *Gas Engineer's Magazine.*

Needless it may be to say that the word which heads this paper is used in its technical rather than its popular sense. And, indeed, it means something rather beyond the sense ascribed to it when the gasworks foreman talks about "putting on the pressure." In all dealings with gases the question of pressure is an important consideration, because the degree of pressure is proportionate to the specific gravity, and inversely the volume of the gas. We talk about a cubic foot of air, at standard pressure and temperature, having a specific gravity = 1; and we know that if we alter the pressure, multiplying it two or three-fold, that the volume will be reduced to one-half, or one-third, and the specific gravity will be increased two or three-fold. All permanent gases are subject to the same law. We leave out of consideration the subject of temperature, which is another cause tending to influence the volume of a gas, and acts quite independently of pressure.

Gas engineers, naturally enough, prick up their ears when causes tending to alter the volume of gas are suggested, for they are accustomed to sell by volume. This brings us to our first problem, "What is the practical effect of pressure in regard to the volume of gas?" Our friend the foreman will, perhaps, suggest that if he doubles the pressure by putting on four inches instead of two, according to the above assertion, he must diminish the volume of the gas in an inverse degree, that is, to one-half; and this his native shrewdness rebels against. So it is necessary to be quite clear, in the first place, on the fact that there are two kinds of pressure to which the gas is subjected: First, there is the atmospheric pressure, and secondly, the artificial pressure which we put upon it. The actual pressure on the gas may be represented as $p = a + g$, where a = atmospheric pressure and g = governor pressure.

As regards these two qualities, a and g, different standards of measurement are used. We measure the first in inches of mercury according to the barometer, and the second in inches of water according to the U pressure gauge. We talk of the barometer standing at 29.5, 29.8, or whatever it may be, and the gas pressure being at 2 inches, 3 inches, or perhaps at so many "tenths," meaning tenths of an inch. For all practical purposes, however, it fortunately happens that these two standards have a fixed ratio to each other, which is represented by the respective specific gravities of water and mercury. A cubic inch of water weighs 0.036 lb., and a cubic inch of mercury weighs 0.488 lb. So it is easy to transfer the barometrical inches of mercury into terms of the governor house inches of water, or *vice versa*. We have simply to multiply or divide, as the case may be, by (0.488 ÷ 0.036 =) 13.56. Or, to put it in the form of an equation, we may say one inch of mercury = 13.56 inches of water.

It is further necessary to remember that a is an uncertain quantity, dependent upon atmospheric conditions, and may be anywhere between 28 and 31 inches of mercury. This variation will have a much greater effect on the volume of the gas than any differences of pressure to which it is subjected in the course of manufacture or supply. It is equivalent to (3 × 13.56 =) 40.68 inches of water. Suppose we have 10,000 cubic feet of gas in a holder, the barometer standing at 31 inches; and that, with no other alteration, the barometric pressure falls to 28 inches. The pressure being reduced, the gas will expand to a similar degree, and the 10,000 cubic feet of gas will become (10,000 × 31) ÷ 28 = 11,071 cubic feet. Assuming the converse to take place, and the gas to be measured at 28 inches, the effect of a rise to 31 inches in the barometer will be that the 10,000 cubic feet of gas will become (10,000 × 28) ÷ 31 = 9,032 cubic feet. We find that the gas will expand or contract to the extent of about 3.4 per cent. for each variation to the extent of 1 inch of mercury by the barometer. So it is quite possible that gas may be actually sold at a considerable difference in bulk from that at which it was actually measured at the station meter; but at the same time it is evident that as the gas is continually being made and supplied the atmospheric variations will be neutralized.

It should also be mentioned that the above is taken rather as an extreme case than as a fair average representation of actual everyday occurrences. It is a very unusual thing for the barometer to fall as low as 28 inches, or to rise as high as 31 inches; in a general way it will be found to be somewhere between 29 inches and 30 inches. So that the variations in volume to which any one 10,000 cubic feet of gas is exposed

during the course of its existence, by reason of alteration in barometric pressure, is not likely to extend beyond the limits of 9,800 cubic feet on the one hand, or 10,200 cubic feet on the other. Even this variation, however, is sufficiently important to show the necessity for taking the height of the barometer into account in connection with photometrical experiments that are intended to have any claim to accuracy.

We are now in a position to answer the question above propounded. "What is the practical effect of pressure in regard to the volume of gas?" The actual pressure is $a + g = p$, and for our present purpose we may assume $a = 29.5$ inches of mercury, and $g = 2$ inches of water. From this we get $p = (29.5 \times 13.56) + 2$ inches of water $= 402$ inches of water. The effect of adding another inch pressure is to increase p to 403, or of taking one off to reduce p to 401, and to influence the volume in a proportionate degree. So that, speaking approximately, the effect of each inch of governor house pressure is to influence the volume of the gas to the extent of $\frac{1}{400}$, or 0.25 per cent. A sample of gas measured as 10,000 cubic feet at the station meter under the full holder pressure, which may be about 6 inches, would therefore measure out as 10,100 cubic feet at the consumer's meter under a distributing pressure of 2 inches.

There is a general disposition among gas engineers, probably by reason of want of definity in the comprehension of the above simple elementary data, to exaggerate the effects of governor house pressure as regards the volume of a gas. I have even heard it alleged, as a reason for keeping down the pressure of gas supply, that the gas would measure out better at the lower pressure. An assertion of this kind, however, is one of degree, and its value depends entirely on that of the term "better," which may mean anything between 0.1 or 10 per cent. We have seen above that the difference in volume for each inch of water is 0.25 per cent., and, therefore, that for each tenth is 0.025. So the advantage gained by starving the pressure to the extent of a few tenths is of a very infinitesimal kind. On the other hand, when the excess of pressure exceeds an inch of pressure beyond that actually desirable the difference in volume begins to assume proportions worthy of attention.

The subject of variations due to pressure also enables us to deal with another problem that crops up every now and then in gas engineering circles in one form or another. Some student or engineer desires to know the effect of altitude on the volume of gas, and his question is usually something like this: If 10,000 cubic feet of gas were measured at an altitude 100 feet below that of the governor house, and another 10,000 cubic feet were measured out at an altitude 200 feet above, what would be the difference in the volumes? The idea is that 20,000 cubic feet of gas, as measured at the governor, are passed out into the mains of a district; 10,000 cubic feet go to a low-laying locality, and are then measured through a consumer's meter situated at a level 100 feet below that of the governor house; and the other 10,000 cubic feet pass on to the top of a hill, and are there measured through a consumer's meter at a point 200 feet above the governor house level. It is necessary to find the value of the actual pressure p in each case. Let us represent the pressure at the high level by p^h and at the low level by p^l. Then we have, as previously shown—

$$p^h = a^h + g^h$$
$$p^l = a^l + g^l$$

The values of g are easily arrived at by the simple rule that the pressure increases to the extent of one inch of water for each 100 feet increase in altitude. Taking g = governor house pressure, we find that $g^h = g + 2$, and that $g^l = g - 1$. So if g be taken as $= 3$ inches, $g^l = 2$, and $g^h = 5$ inches.

In this problem the fact that a is also subject to variation with change of altitude is rather apt to be overlooked. It is also necessary to arrive at the value of a^l, a, and a^h. The barometrical pressure varies with the altitude, since it depends upon the depth or height of air above. a^l will be 100 feet greater than that above a, and 300 feet greater than that above a^h. Seeing that the specific gravity varies as the pressure, it follows that at heights increasing in arithmetical progression the pressure decreases in geometrical progression. This principle, as is well known, is applied for the measurement of altitudes, and it is found that at or near ordinary sea level a difference of 0.1 inch in the height of the barometer represents about 90 feet in altitude. Applying this approximate rule, and assuming that $a = 29.5$ inches, we have $a^l = 29.5 + 0.11 = 29.61$ inches, and $a^h = 29.5 - 0.22 = 29.38$ inches. Expressed in terms of inches of water—

$$a^l = 29\ 61 \times 13.56 = 401.5.$$
$$a = 29.5 \times 13.56 = 400.0.$$
$$a^h = 29.38 \times 13.56 = 397.0.$$

Having already shown the value of g^l, g, and g^h, the value of the actual pressures at each point can now be determined as follows:

$$p^l = a^l + g^l = 401.5 + 2 = 403.5 \text{ inches.}$$
$$p = a + g = 400.0 + 3 = 403.0 \text{ "}$$
$$p^h = a^h + g^h = 397.0 + 5 = 402.0 \text{ "}$$

Speaking in a practical sense, it will be noticed that the alteration in the barometrical pressure a is just half that due to the increase of governor pressure caused by the ascensive power of the gas; and if we halve the ordinary U-gauge pressure indications we shall arrive at something like the actual effects of volume. According to pressure guage indications g, the difference between the highest and lowest level is $5 - 2 = 3$ inches. But, as above shown, the difference between the actual pressure p, which really determines the volume, is $403.5 - 402 = 1.5$ inches. From this it follows that 10,000 cubic feet delivered from the governor would measure out $(10{,}000 \times 403) \div 403\frac{1}{2} = 9{,}987\frac{1}{2}$ cubic feet at the low level, and $(10{,}000 \times 403) \div 402 = 10{,}025$ cubic feet at the high level.

The differences of level usually met with in ordinary districts, therefore, have no appreciable influence as regards the proportion of unaccounted-for gas, and the chief consideration in connection with pressure is the fact that the gas is measured at the station meter under the full holder pressure, usually not less than 5 or 6 inches, and therefore occupies a volume of about one per cent. below that at which it should measure out at the consumer's meter.

In some works the readings of the station meter are reduced to standard conditions of temperature and pressure. In doing this, however, the effect of the governor pressure g is not usually considered. The conditions of the atmosphere, as shown by the readings of the barometer and thermometer, are simply read off, and then the gas is reduced to terms of 60° and 30″. From the foregoing it is evident that if the correction is to be accurately made, the pressure gauge indications must be read off and added to the barometer readings in the case of the gas.

It is also to be observed that the governor house pressure g is not an absolute but a differential quantity. Although constant in itself it simply represents an excess over the changeable atmospheric pressure.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. Geo. F. Mellen, whose pronounced success in anything he ever took hold of in a business way—and many mercantile monuments are standing in Fall River, Mass., to-day as testimonials to his capacity—in Fall River has assumed the general management of the Connelly Street Railroad Equipment Company of this city. The Messrs. Connelly are to be congratulated over this pleasant business alliance.

Mr. John H. Golding has been appointed Manager of the Bay Shore (Long Island) Gas Light Company. One of his first acts was to remove the main pipes, distributed along the route from Bay Shore to Babylon, which it was proposed to use as gas conveyors to the latter place. Although every arrangement had been made to bury the mains, the Trustees of Babylon refused to grant the Bay Shore Company a franchise to supply gas. Poor Babylon.

The Massachusetts Board of Gas Commissioners have reported favorably regarding the application of the Amherst Gas Company to supply electricity for light and power in that town. President Hills, it is said, will make important improvements this season on the local gas plant.

At the annual meeting of the Peoples Gas Light and Coke Company, Chicago, Ills., the following officers were chosen: President, C. G. K. Billings; Vice-President, George O. Knapp; Secretary and Treasurer, John Zimmerman. The annual reports, in respect to an increased business, were eminently satisfactory.

The Messrs. Runkle, of this city, who are holders of a large block of the bonds of the Municpal Gas Light Company, Rochester, N. Y., acting with other capitalists, have made a proposition to purchase a controlling interest in that sterling old gas property, the Rochester Gas Light Company. The offer was accepted by the majority interest in the Company, although there was much grumbling amongst some of the smaller holders. For instance, Mr. Chester P. Dewey—a son of that Nestor of mathematicians, the late Prof. Dewey—is on record as saying that this is a case of "needs must," etc. Although his holding was quite small he would prefer to remain a minnow among Tritons, while any choice was left; but when the Tritons were ready to appease their appetites he thought he might better look out for another stream.

Batavia, N. Y., seems to have given up the idea of installing a municipal electric lighting station; for we note that the Board of Aldermen

have instructed the Committee on Lights and Lamps to ask for bids for lighting the streets from the Batavia Gas Light Company and the Westinghouse folks, respectively.

In the suit of Taylor against Baldwin (otherwise known as "Lucky" Baldwin), the Supreme Court of California has reversed the decision obtained by plaintiff in the court of first resort. When Baldwin, who is known from one end of the States—if not the globe—to the other, engages in any enterprise, he usually wants a complete outfit in every respect. Hence when he determined to construct a magnificent hotel, a complete theater and a model market in the city of San Francisco—the three buildings being within fair range of one another—the plans included a gas works. When the latter were put in operation the plant moved on in harmony, and was voted a great success—this opinion, however, being entertained for about five weeks. About this time squalls came in the shape of a greatly decreased pressure, and Superintendent Taylor, without making any critical examination—about equal quantities of gas were being made and consumed under the troublesome state of affairs as before when things were smooth—determined to mend the conditions by readjusting the gasholder weights. The first development was to unseal the holder, the second was an escape of gas, the third was an explosion, and the result was severe injuries to the Superintendent. When he recovered from the latter he sued Baldwin for $10,000 damages, and obtained a 25 per cent. verdict, which verdict has just been set aside. During the trial it transpired from the evidence that the reduction in pressure was caused by the unexplainable presence of a tattered gunny sack in the outlet pipe from holder.

The New York Metal Company (capitalized in $250,000) has been chartered to operate in Portland, Maine. The Directors are: W. D. Tilden, S. F. Adams, F. B. Thurber, W. M. Jackson and Geo. T. Gaden, all of New York city. The objects are, "To manufacture, buy, sell and lease gas fixtures, gas burners and other appliances to be used in the consumption of gas."

"Cincinnati, Ohio, April 6, 1889.—My attention was called this morning to a communication in the Journal, issue of April 1st, signed by A. M. Sutherland, who objects to my remarks directed to the oil gas exhibition at Elyria, Ohio, early last March. I am extremely well pleased to hear that these exhibitions are prepared especially for the benefit of 'front-rank' gas men; and now that the force of this occurs to me it is perhaps well that the 'front rankers' are so frequently represented at these seances. It is a good way to disseminate knowledge amongst the fraternity as to the absolute worthlessness of 49 out of every 50 (to use Mr. Egner's nicely pointed way of putting it) patents invented that are to lead us on to cheaper gas. And we ought to heartily thank the 'front rankers' for their disinterestedness, not to say self-sacrificing practice, in journeying about, at their own expense, to personally witness an exhibition that they are morally certain is to be but a repetition of the failures they had assisted in uncovering at other times. From what I know of the Elyria test—and I did not visit Elyria with the object of examining the Sutherland system at all—I would like to go on record as believing that that system is about as faulty as any that I have ever seen for the purpose of converting crude oil into gas. It is incomplete and valueless. That this might be proven all I would ask is that Mr. Sutherland would consent to publish in the Journal a detailed sectional illustrated description of his apparatus and system. Would he but do this the 'front rankers' could rest content at home that there was nothing in it. I am driven to these remarks by the disingenuous tone in which Mr. Sutherland's reply is couched, which is capped in the sentence that closes his second paragraph. The richness of his claim that 'by a simple and very inexpensive process, not previously tried, I make more gas from a given quantity of crude petroleum than has been made on any other plan, and that I successfully mix air with it as a diluent,' is great. All of this might be so, and Mr. Sutherland might not have much at that. It will also be noted that Mr. Sutherland does not deny any connection with the Rahway process fiasco; and I had it from Mr. Houston, former Secretary to that Company, that the Laue-Sutherland operations there were of no value whatever. Mr. Sutherland also fails to make any reference to the Hudson River district in which he has or had been operating. Possibly the people owning the Avery patents—which are by no means to be looked upon as veritable gems in point of worth—may have something to say about this matter later on. In any event, let me assure Mr. Sutherland that the 'Inventor Crank' who could cause me a moment's uneasiness on any score has not yet revealed himself.—T. A. J."

The powers-that-were, because of the result of the recent municipal elections in Chicago, seem to be very much cast down; for at a recent meeting of the City Council Comptroller Burley sent in an order authorizing the Mayor and Comptroller to enter into a contract with the different gas companies for public lighting, at the same rate as that paid last year. The order was adopted without debate.

The reduced gas rates at Mansfield, Ohio, which took effect a fortnight ago, are based on the following schedule, the net rate to operate on bills paid on or before the 10th of each month:

Gross, per 1,000.	Net per 1,000.
Illuminating gas, $1.50	$1.25
Gas for stoves and power, $1.25	1.00

The gross and net rates prevailing before the reduction were:

Gross, per 1,000.	Net per 1,000.
Illuminating gas, $1.80	$1.50
For stoves and power, $1.60	1.30

This makes all the plainer the liberality of the Company's recent move.

A fortnight ago we intimated that Mr. Peter Bauer was likely to be named receiver for the bondholders who are about to wind up the affairs (and the stockholders) of the Moberly (Mo.) Gas Light Company. Strange as it may seem, the majority favored Bauer, but the minority—who are residents of Moberly—managed to secure the appointment of a Mr. Geo. L. Hassett (whose card reads, "Past Eminent Commander of Tancred Commandery, K. T., No. 25, of Moberly"), who volunteered to serve without remuneration. Mr. Hassett, however, acted wisely at the outset in retaining the Superintendent (Mr. Smart) and the working staff as well.

The Forty-Second Annual Report of the Montreal Gas Company is before us, and from it we glean the following particulars: The report refers to the satisfactory results of the past year's business, and that the increase in sendout has been well up to similar records of other years. During the year two semi annual dividends of 6 per cent. each were declared. In addition to the purifiers now in use four more boxes (25 ft. by 35 ft. each) on the latest and most approved plans have been contracted for. Together with a new building to cover them, these will be installed at the Elm station this summer. The holder to replace the one destroyed by the explosion of May 28, 1888, will be in working order next month. Six miles of mains were laid during the year. The results of Mr. Scriver's wanderings in England in search of an engineer to take charge of the plant has been the selection of Mr. Sidney E. Stevenson, C.E., who had been in charge of the gas plant at Exeter, England. This gentleman has had marked success at Exeter, the gas works at that point comfortably carrying a share capital of £105,000 on a population of, perhaps, 55,000. The following figures in connection with the Montreal Company's working may prove interesting:

Working Account from 29th Feb., 1888, to Feb. 28, 1889.

Dr.	Coals carbonized (value)		$171,615.73
	Salaries		22,960.68
	Wages		58,658.16
	Purification		12,172.59
	Wear and tear		27,427.04
	Corporation taxes		11,941.32
	Government taxes		2,499.50
	Sundries		15,304.93
	Reconstruction		10,000.00
			$332,579.25
	Balance		305,125.21
			$637,705.16
Cr.	Gas rentals	$485,254.94	
	Less, bad debts, written off	10,846.65	
			$474,408.29
	Gas rent, 2,468 street lamps	$47,596.25	
	Less lighting expenses	12,910.76	
			$34,686.19
	Coke sales and quantity on hand	$111,336.59	
	Less carting and handling	15,008.67	
			$96,327.72
	Coal tar sales and stock on hand		27,189.02
	Sales ammoniacal liquor		934.73
	Sales old metal, etc		1,364.94
	Interest		2,067.62
	Rent of property		726.65
			$637,705.16

A very neat piece of legislation is that asked for from the Ohio Legislature by Senator Rathbone—in fact, it is in keeping with either one or

both of the syllables of that honorable gentleman's name. He only asks the State to direct that all employees of a gas company, engaged in "reading" gas meters, shall at once make known the amount consumed to the person who is to pay therefor. A violation of this mandate is to be punished by a fine not less than $25, nor to exceed $300. We venture to assert that that proposition is unique in every sense of the term.

CANTON, Mass., has appointed a Committee—Ed. R. Eager, Willis S. Shepard, Augustus Hemenway, W. B. Revere, Frederic Endicott, J. W. C. Seavey and Chas. H. French—to investigate the question of an artificial lighting system. From the drift of the sentiments ventilated at the meeting at which this action was taken, we think it likely that inducements will be offered capitalists to install a gas and electric combined plant at this point. As Mr. Shepard put it, Canton wants arc lights for her streets and gas in her residences. Canton is eligibly situated on the Neponset river (at a point 14 miles south of Boston), and also on the Boston and Providence Railroad. It has a population of, perhaps, 6,500 souls, and is a brisk, live place.

MESSRS. BROWN & WARREN are putting an addition (20 by 50 feet, and two stories high) to the buildings of the Exeter (N. H.) Gas Company. The premises will be devoted to storing lime and other supplies, and one floor is to be used as a pipe fitting shop.

MR. W. W. DAVENPOPT has been chosen by the proprietors of the Bartlett Street Lamp Manufacturing Company to fill the dual position of Secretary and Treasurer to the Company, made vacant by the demise of his father, the late Mr. T. Davenport.

IN connection with our prior mention of the Montreal Company's annual report, it ought to have been noted that the amount paid, in full of all compensation for every damage to person and property, on account of the wreck last May by explosion of the holder at the Elm station works, is returned at $58,000. Of this sum about 90 per cent. is charged to reconstruction. The only change that occurred in the election for a Board of Directors was the substitution of Mr J. P. Dawes for Mr. Robert Hampson, resigned. By the way, the personal and family holdings of the Jesse Joseph interest in the Montreal Company amount to 2,144 shares.

"SOME time ago the JOURNAL noted that A. J. Goodrich had instituted suit against the Wallingford (Conn.) Gas Light Company, complainant alleging that the Company was responsible for the destruction of numerous shade trees fronting his property. Leaky mains were charged with the slaughter. Goodrich asked for $900, which impels me to remark that shade trees are rather valuable property in certain sections of fair Connecticut. Goodrich's demand had the further effect of stirring up one Patrick O'Connell, who asks for $600 damages occasioned to pet trees of his, because of the gas company. The cases will be argued in New Haven to-day. The cheeky nature of both claims will doubtless be better appreciated when I say that Goodrich wants $900 for two elm trees 'of about 20 years' growth,' and two Norway spruce trees, also 'of about 20 years' growth, all of great value to the plaintiff as shade and ornamental trees, and which greatly enhanced the value of the plaintiff's said premises.' O'Connell, however, must have a most exalted idea of the belongings which rule towards home beautification—especially in the matter of arboricultural ornamentation—for he wants $600 for the killing of 'three elm trees of about 15 years' growth.' In my opinion either of the tree-losers will be more than repaid (even presuming that the Wallingford Company is responsible for the damage) if the round sum of $100 is allotted for distribution between them by the learned jurists of New Haven—and New Haven thinks a good deal of her noble samples of the *ulmus* type.—HADDAM."

TOWARDS the close of last month the buildings that housed the plant of the Tacoma (Wash. Ter.) Electric Light Company were destroyed by fire. The loss is about $2,500. No insurance. The machinery, including the dynamos and engine, did not suffer greatly. As the Company was performing most of the city lighting, much confusion resulted.

IN 1885-6, Richard Shanahan, of Portland, Maine, was awarded a contract for constructing what is known in Portsmouth, N. H., as the Millpond sewer. As might be expected, Shanahan did not pay much attention to such trifles as gas pipes that were encountered in his excavating operations. The Deer street arm was put down in a more than ordinarily reckless fashion, the result being that many rents were caused in the gas company's mains. The proprietors of the latter insisted that Shanahan make good the ravages of his navvies, and this he promised to do. Time, however, dragged; but the check from Shanahan was never signed, much less received. Eventually the Company brought suit, and the case was argued last week. While not positive as to the outcome, it is our impression that the plaintiff was given an award in the sum of $860. Figuring on this basis, how large a sum does Contractor Crimmins owe to the New York gas companies for damages done to their main pipes while he was engaged in putting down that local abortion intended to serve as an electrical lines subway?

ABOUT as greatly a surprised individual as there was in the State of Connecticut was Mr. C. A. Gerdenier, of Bridgeport, whose flurried mind dates back to Saturday, April 6th. Of course, that urbane gentleman knew that on the day in question he was rounding out his 25th year in the Superintendency of the Bridgeport Gas Light Company, and no doubt he was in a decidedly reminiscient mood. Gerdenier, too, is not slow to perceive when something is in the wind, and he had had occasion to note that the "boys" connected with the works had for some days been inclined to indulge in the practice of gathering in out-of-the-way places, during which conclaves the conversation was not very loud. Further, when he approached said groups, the members thereof seemed to be stricken with loss of speech. It all came out on that Saturday, however, when, without warning, he was summoned to a gathering of the men. We need not say anything about the way in which the presentation was made, how the gift was uncovered, and how the recipient was staggered. It is all told when we say that Mr. Gerdenier is now the owner of a handsome oaken desk, and that his subordinates are to be charged with its purchase and presentation. The ceremony was supplemented by an individual offering to Mr. Gerdenier (by Mr. James Dooley, whose name has been on the pay-roll of the Company since 1862) of a case of champagne. Hence it may be inferred that the closing hour of the presentation was marked by gurgle and sparkle.

S. N. SMITH, representing the Central Electric Light and Power Company, Topeka, Kas., has been awarded a contract to light the city of Sedalia, Mo., for a period of 5 years. The Sedalia Gas and Electric Light Company and Deutsche Morrow, of St. Louis, were the other bidders. Mayor Crawford evidently believes in punishing home capital.

SOME time ago we noted that a Wm. Spielmeyer had brought suit for damages against the Consolidated Gas Company, of Baltimore, Md. Briefly restated, Spielmeyer had been accused by the Company of purloining gas by means of an unmetered connection; was tried for it in the Criminal Court and acquitted. In his damage suit, which was tried last week before a jury in the City Court, he obtained a verdict for $125, although the Judge's charge to the "twelve good men and true" was tantamount to an instruction to dismiss the case.

THE Newburyport (Mass.) Gas Company has petitioned the Board of Gas Commissioners for permission to absorb the franchises and business of the local electric lighting company.

MANY odd and perplexing letters are received at the JOURNAL office, and these are answered—often at the expense of our petty cash, and always at an expenditure of time. We, however, must draw the line somewhere, and think it ought to be drawn at the following; which query we respectfully submit to our readers, although the submission is made in the certain knowledge that not one of them could come within "10,000 per cent. of the mean." The query is: "Do you know how many burners there are in use in New York city; and is there any published list showing the number of burners in use in various cities in this country?" To both the questions our reply is "No."

MR. MELLEN'S bill authorizing the purchase and operation, by the cities and towns of Massachusetts, of existing gas and electric light plants, seems to have had its origin in a desire on the part of the proprietors of the Spencer Gas Company to saddle that township with their white elephant of a gas venture. The Spencer Gas Company was, in conjunction with a similar scheme at Cottage City, started to show how cheaply certain patent systems owners could manufacture and supply fuel gas; but the proof of their respective success is shown, first, at Spencer, where the Company is going so steadily behind that its proprietors are willing to revolutionize the policy of a State in order that Spencer township may make a ground-floor investment, and, secondly, at Cottage City, the present state of which Company is outlined below:

This can be best illustrated by reprinting the following advertisement from the *Cottage City Herald*, of April 10, which is published at the instance of the Merchants National Bank, of New Bedford: "By virtue of a license granted by the Insolvency Court for the County of Dukes, Feb. 19, 1889, will be sold on the premises, formerly of the Cottage City

Gas Company, on Friday, April 19, 1889, at 3 o'clock P.M., the following property, described in a mortgage deed given by the Cottage City Gas Company to Samuel C. Hart and others, in book 76, page 394; and also in the office of the Clerk of the town of Cottage City, Mortgage deed book, 1, folio 483, viz.: All the franchises real estate, machinery, lights, poles, wires and other property of every description owned by said Cottage City Gas Company, or used at the time of said mortgage by said Company in the business of said Company at said Cottage City, which real estate consists of lots numbered 3, 5, 7, 8, 9, 10, 11 and 13, with the buildings thereon, situated on Uncas avenue, as set forth, etc. Such sale of said franchise being so far as may be authorized at time of sale by said license, mortgage, or any provision of law. Terms: 25 per cent. in cash at sale, and the balance payable in 10 days from such sale."

This is plain enough; further, we believe that if the purchasers determine to operate under a rational process of manufacture and supply, Cottage Citty might be counted on to furnish a fairly profitable field for remunerative gas working.

WE regret to record the death of Mr. Geo. H. Wood, of Boston, Mass., who for years had served on the collection staff of the Boston Gas Company. Deceased, who was in his 45th year, was prominently identified with the G. A. R. Society, and was much esteemed.

THE electricians promised to "make it hot" for the Northampton (Mass.) Gas Company when their wires were strung. Although the lines have been stretched for some time, we are happy to say that Brother Crafts is preparing for a system of betterments (in which extension account will figure largely) on the gas plant under his charge. There is a better dog than Brag.

ACCORDING to the scheme proposed for awarding the contract for public lighting in Baltimore, Md., arc system, the following items are to be insisted upon: The contract is to be awarded to the lowest responsible bidder whose bid shall not exceed 40 cents per light per night; proposals are to be invited by means of advertisements (to be published for three weeks) in three daily papers, and the contract is to be for two years. The successful bidder shall enter into a bond for $20,000. Each bidder must deposit $5,000, which will be forfeited by the successful bidder if the contract is not entered into or if the bond is not given.

IF the present proposed public arc lighting schedule and allotment are agreed to at Lansingburgh, N. Y., the taxpayers will be called on to pay an additional one per cent. on each $1,000 of valuation as shown by the tax rolls.

AT the annual meeting of the Consumers Gas Company, Newburgh, N. Y., the following Directors were chosen: Jno. C. Adams, Ben. J. Macdonald, and Isaac L. Corwin, of Newburgh; J. H. Berry, of Detroit, Mich.; and O. H. Lawrence, of Fitchburg, Mass.

A RESOLUTION, offered by Councilman Higgins, instructing the Committee on Light, Richmond, Va., to recommend such measures as they deem best to prevent a decrease in the receipts from the sales of gas, as well as the depreciation of the value of the gas plant, was referred to the Committee's Chairman, acting in conjunction with Superintendent Adams. They are to report at the next Council meeting.

MESSRS. HARRIS, GRIFFIN & CO. are to supply gas meters to the Richmond authorities for the current year. They were the lowest bidders.

THE petition of W. Dorey, J. K. Doolittle and W. F. Palmer, for the right to manufacture and distribute fuel gas in Minneapolis, Minn., has been rejected by the Ordinance Committee of Council.

THE Memphis (Tenn.) Gas Light Company has been awarded the contract for supplying gas to the public buildings, the Committee's recommendation of a week ago to that effect having been ratified by Council.

THE electricians have offered to supply public arc lights to Memphis on the following basis: 80 or more arcs (2,000 candle) at $15 each per month, lights to burn for 24 nights and all night; if fewer lights are ordered, the price to be $16 per month.

MR. TABER hopes to have the entire electric lighting plant of the New Bedford (Mass.) Gas and Electric Light Company safely housed in the new building on Coffin street by moving day. The total capacity of the generating station will be equal to the following current supply: 4,200 16-candle power incandescent lamps; 410 arcs of 2,000-candle power; 100 arcs of 1,200-candle power; and a 50-horse power motor machine.

Commercial Anthracenes.

At a meeting (Mar. 19) of the Chemical Section of the Franklin Institute. Dr. Jayne exhibited some specimens of commercial anthracenes. He stated that at present it is rarely made in this country, as there was no market for any quantity of the hard pitch which would be obtained in distilling tar for anthracene, and as all produced would have to be sold abroad, it was only made by a couple of firms, and then only when prices were high.

About 20 per cent. more of the tar was distilled off than when soft pitch was made, the distillate after cooling is filtered by means of a filter press. The resulting soft cake contains from 10 to 15 per cent. of anthracene, depending on the quality of the tar, the temperature of the oil, and the pressure employed in filtering. This is then generally pressed in hydraulic presses, the percentage of anthracene then rising to about 25 to 30 per cent. This can be still further increased by treating with solvents, coal tar, naphtha, benzine, creosote oil, etc. The impurities partly dissolving, on re-pressing the residue an anthracene of about 45 per cent. could be obtained. Recently it has been proposed to use as a solvent a mixture of solvent naphtha and the pyridine basis of coal tar; from such a solvent, it is said, anthracene of 80 per cent. can be obtained commercially. The process is said to be in operation in Germany in two factories.

The crude anthracene is not generally purified further by the tar distillers, but sold as such to the alizarine makers. The presence of any quantity of paraffines renders anthracene unsalable, as it interferes greatly with the subsequent treatments in the alizarine manufacture.

In England they are classed as A and B qualities.

A quality is an anthracene made from New Castle coal, and is more valuable, as it contains less paraffines.

B quality is made from Lancashire and Yorkshire coals, but it is customary to rate all anthracene not from New Castle coal as B quality without further examination; for this reason American anthrecene is considered of B quality.

It is sold at a certain price per unit or percentage of real anthracene it contains.

For instance, the present price in London is about 30 cents per unit per hundred weight for A quality, and 26 cents for B.

Therefore A anthracene of 45 per cent. or units is worth 30 × 45, or $13.50 per hundred weight, and B quality $11.70.

The per cent. is generally determined by the amount of anthraquinone produced under certain conditions, the method being known as the "Hoechst" test. A weighed quantity dissolved in glacial acetic acid is oxidized by a solution of chromic acid in acetic acid. The resulting anthraquinone, after washing and drying, is dissolved in sulphuric acid of 1.88 on the water bath, and, after complete solution, precipitated by water, and weighed, then burned, and the resulting ash deducted.

Method of Hollow Building.

Herr J. Grude, a prominent Scandinavian architect, proposes the following: In order to save materials, and prevent the penetration of moisture to the inner surface of walls, it is generally known that the custom has prevailed of making the walls hollow, the inner and outer brick wall being separated by a few inches, and connected at certain intervals by bonding stones. However, this mode of building does not entirely obviate the difficulty referred to, the binding stones often acting as moisture conductors, although in a much smaller degree than the solid brick wall. To overcome this drawback, and isolate the outer and inner wall completely, Danish builders some years ago hit upon the idea of using steel wire frames for connecting the walls, and which has proved most effective.

The mode of building is as follows. The brick walls of the building having been well isolated from the stone foundations by means of a layer of asphalt or felt, the inner, as well as the outer, wall is built up of half bricks, with a space between of from 4 to 6 in. The thickness of the wall will thus be from 13 to 15 in. Then, at every third layer of bricks with a horizontal distance of four bricks, or 3 feet, a row of steel wire cube-shaped clamps are inserted, which, however, must not be closer to either wall than 1 to 1½ inches. The clamps are pressed into the soft mortar by the overlying bricks, and thereby become fixed between the walls. In this manner an unbroken stratum of air is left between the two walls, and as the steel wires do not act as moisture conductors, the inner wall is for all practical purposes isolated. For the making of the clamps galvanized steel wire, from 3 to 4 mm. in thickness, is used, the wire being formed into a cube by being twisted around wooden pegs at each corner, the latter being drawn out subsequently.

The Market for Gas Securities.

Consolidated during the week approximated to something more nearly its intrinsic value than that shown by it (according to the Wall barometer, at least) for the past year. At noon to-day (Friday, April 12) sales are reported at 88⅝, which shows an advance for the week of 5⅝ points. It is a queer logic that dictates the purchase at over par of a New York city 2½ per cent. interest bearing bond, but which neglects an opportunity to invest at 8½ tenths in a virtual 4½ per cent. share in a perfectly stable business, backed by a representation of 75 per cent. of its capital stock in the most available real estate in America. Consolidated gas would be cheap at par. Other city gas shares show no marked change. In Brooklyn shares the situation is about as before, with a tendency to better prices. The purchase of the Rochester (N. Y.) Company by those interested in the local Municipal Company was made on singularly advantageous terms to the buyers, who are said to have secured control at par. Certainly the smaller holders got no better figure. The Troy (N. Y.) purchase by the Brady-Benedict syndicate, of Albany, was also effected on a cheap basis, the average price being $125 per share. This was a remarkably low figure.

The St. Louis situation remains practically unchanged. New York, Philadelphia and foreign capitalists have purchased the control in Laclede at $140 per share, and the dickering now going on is to fix a price for the Trust certificates. Probably these will be acquired at a figure between 75 and 80. All things considered, and in the light of recent developments, we retract our advice not to accept the bid for Laclede. The new proprietors are likely to carry on the gas supply of St. Louis on a peculiar basis. Having conquered Boston and found it rather warm in Delaware, Mr. J. E. Addicks "and others" applied to the January session of the Rhode Island Legislature for an act to incorporate the Rhode Island Gas Company with a capital of 5 millions dollars. We believe the purpose is to eventually consolidate the gas business of the State, which leads us to the remark that the capital sum named ought to be sufficiently large. The "petition and bill," however, have been continued to the next General Assembly. The syndicate, it seems to us, will likely have a much harder time in convincing the Rhode Island Legislature of the purity of their motives than was the case with their attempts in a similar direction on the Boston Aldermanic Board of 1884.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 Wall St., New York City.

April 15.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	88⅜	—
Central	466,000	50	—	—
" Scrip	220,000	—	47	57
Equitable	4,000,000	100	115	117
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	116	118
Mutual	3,500,000	100	98	100
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern	125,000	50	30	—
" Scrip	108,000			
Yonkers		50	90	100
Richmond Co., S. I.	300,000	50	55	60
" Bonds	12,000	—	—	—

Advertisers Index.

GAS ENGINEERS. Page

Jos. R. Thomas, New York City ... 516
Wm. Henry White, New York City ... 510
Wm. Mooney, New York City ... 516
William Gardner, Pittsburgh, Pa ... 516
Fred. Bredel, N. Y. City ... 515

CHEMISTS.

Durand Woodman, Newark, N. J ... 506

PROCESSES.

National Gas Light and Fuel Co., Chicago, Ills ... 510
Bartlett, Hayward & Co., Baltimore, Md ... 507
Wm. Henry White, N. Y. City ... 510
United Gas Improvement Co., Phila., Pa ... 509
Henry Pratt & Co., Chicago, Ill ... 518

GAS AND WATER PIPES.

Gloucester Iron Works, Phila., Pa ... 516
Mellert Foundry and Machine Co., Reading, Pa (John Fox, Selling Agent, N. Y.) ... 516
Ohio Pipe Co., Columbus, Ohio ... 516
M. J. Drummond, New York City ... 516
R. D. Wood & Co., Phila., Pa ... 518
Warren Foundry & Machine Co., New York City ... 516
Donaldson Iron Co., Emaus, Pa ... 516
Dennis Long & Company, Louisville, Ky ... 516

GAS WORKS APPARATUS AND CONSTRUCTION.

James R. Floyd & Sons, New York City ... 519
T. F. Rowland, Greenpoint, L. I ... 519
Delly & Fowler, Phila., Pa ... 519
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 518
Stacey Mfg. Co., Cincinnati, Ohio ... 519
Bartlett, Hayward & Co., Baltimore, Md ... 507
Morris, Tasker & Co., Limited, Phila., Pa ... 506
Davis & Farnum Mf'g Co., Waltham, Mass ... 517
R. D. Wood & Co., Phila., Pa ... 518
Bouton Foundry Co., Chicago, Ills ... 519
Smith & Sayre Manufacturing Co., New Yotk City ... 519
Fred. Bredel, N. Y. City ... 515
United Gas Improvement Co., Phila., Pa ... 509
Henry Pratt & Co., Chicago, Ill ... 518
National Gas Light and Fuel Co., Chicago, Ills ... 510

RETORTS AND FIREBRICK.

J. H. Gautier & Co., Jersey City, N. J ... 514
B. Kreischer & Sons, New York City ... 514
Adam Weber, New York City ... 514
Laclede Fire Brick Works, St. Louis, Mo ... 514
Brooklyn Retort and Fire Brick Works, Brooklyn, N. Y ... 514
Borgner & O'Brien, Phila., Pa ... 514
James Gardner, Jr., Pittsburgh, Pa ... 514
Henry Maurer & Son, New York city ... 515
Chicago Retort and Fire Brick Co., Chicago, Ills ... 515
Baltimore Retort and Fire Brick Co., Baltimore ... 514
Oakhill Gas Retort and Fire Brick Co., St. Louis, Mo ... 514
Emil Lenz, New York City ... 514

REGENERATIVE FURNACES.

Bartlett, Hayward & Co., Baltimore, Md ... 507
Fred. Bredel, New York City ... 515
Chicago Retort and Firebrick Co., Chicago, Ills ... 515
Wm. Henry White, N. Y. City ... 510

SCRUBBERS AND CONDENSERS.

G. Shepard Page, New York City ... 476
R. D. Wood & Co., Phila., Pa ... 518

GAS GOVERNORS.

Connelly & Co., New York City ... 511
Fred. Bredel, N. Y. City ... 515
Friedrich Lux, London, England ... 505

SELF-SEALING MOUTHPIECE DOORS.

Smith & Sayre Mfg. Co., New York City ... 506

TAR AND CARBONIC ACID EXTRACTOR.

Geo. Shepard Page, N. Y. City ... 508

CEMENTS.

C. L. Gerould & Co., Brooklyn, N. Y ... 514

GAS ENRICHERS.

Standard Oil Co., Cleveland, Ohio ... 520

GAS METERS.

Harris, Griffin & Co., Phila., Pa ... 522
American Meter Co., New York and Philadelphia ... 523
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa ... 523
Helme & Mellhenny, Phila., Pa ... 523
D. McDonald & Co. Albany, N. Y ... 523
Nathaniel Tufts, Boston, Mass ... 522

EXHAUSTERS.

P. H. & F. M. Roots, Connersville, Ind ... 506
Smith & Sayre Manufacturing Co., New York City ... 519
Wilbraham Bros., Philadelphia, Pa ... 511
Connelly & Co., New York City ... 511

GAS COALS.

Penn Gas Coal Co., Phila., Pa ... 521
Perkins & Co., New York City ... 520
Newburgh Orrel Coal Co., Baltimore Md ... 521
Despard Coal Co., Baltimore, Md ... 521
Chesapeake and Ohio R.R. Coal Agency, N. Y. City ... 521
Westmoreland Coal Company, Phila., Pa ... 521
Cannelville Coal and Iron Co., Chicago, Ills ... 521
J. & W. Wood, New York City ... 520

CANNEL COALS.

Perkins & Co., New York City ... 520
J. & W. Wood, New York City ... 520

VALVES.

Ludlow Valve Manufacturing Co., Troy, N. Y ... 512
John McLean, New York City ... 512
Chapman Valve Manufacturing Co., Boston, Mass ... 512
R. D. Wood & Co., Phila., Pa ... 518

GAS ENGINES.

Schleicher, Schumm & Co., Phila., Pa ... 492
Clerk Gas Engine Co., Phila., Pa ... 512
Van Dusen Gas Engine Co., Cincinnati, Ohio ... 512

ENGINES AND BOILERS.

Jarvis Engineering Co., Boston, Mass ... 511
Ball Engine Co., Erie, Pa ... 506

GAS LAMPS.

The Siemens-Lungren Co., Philadelphia, Pa ... 517
G. Shepard Page, New York City ... 512
Albo-Carbon Light Co., Newark, N. J ... 511
Standard Gas Lamp Co., Phila., Pa ... 505

PURIFIER SCREENS.

John Cabot, New York City ... 512
Geo. A. Mills, Baltimore, Md ... 512

GAS STOVES.

American Meter Co., New York and Philadelphia ... 513
The Goodwin Gas Stove and Meter Co., Phila. Pa ... 524

STREET LAMPS.

J. G. Miner, Morrisania, New York City ... 474
Bartlett Street Lamp Mf'g Co., New York City ... 505

BURNERS.

C. A. Gefroner, Phila., Pa ... 520

STEAM BLOWER FOR BURNING BREESE

H. E. Parson, New York City ... 480

PURIFYING MATERIAL.

Connelly & Co., New York City ... 511
Friedrich Lux, London, England ... 505
Edgewater Lime Works, Edgewater, N. J ... 505

GASHOLDER TANKS.

W. C. Whyte, New York City ... 523
J. P. Whittier, Brooklyn, N. Y ... 508

COKE CRUSHER.

C. M. Keller, Columbus, Ind ... 521

ELECTRICAL APPARATUS.

Wm. Henry White, N. Y. City ... 510

BOOKS, ETC.

Goodwin's Directory of Gas Light Companies ... 515
King's Treatise ... 516
Scientific Books ... 490
Management of Small Gas Works ... 512
Gas vs. Electricity ... 514
Practical Electric Lighting ... 511
Electric Light Primer ... 511
American Gas Engineer and Superintendents' Handbook ... 521

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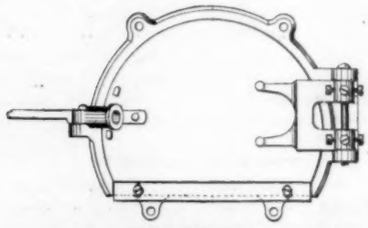

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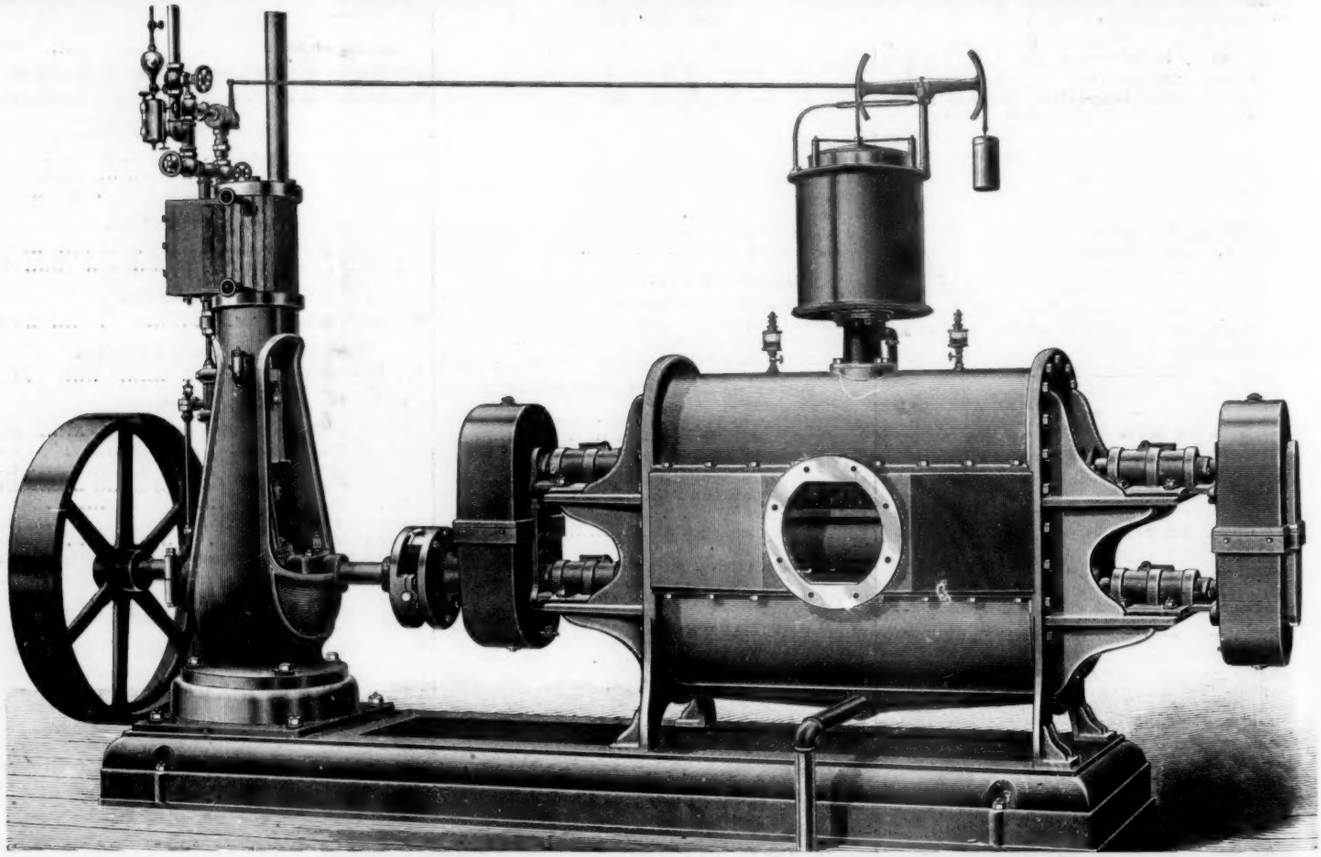

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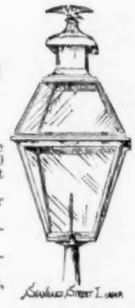

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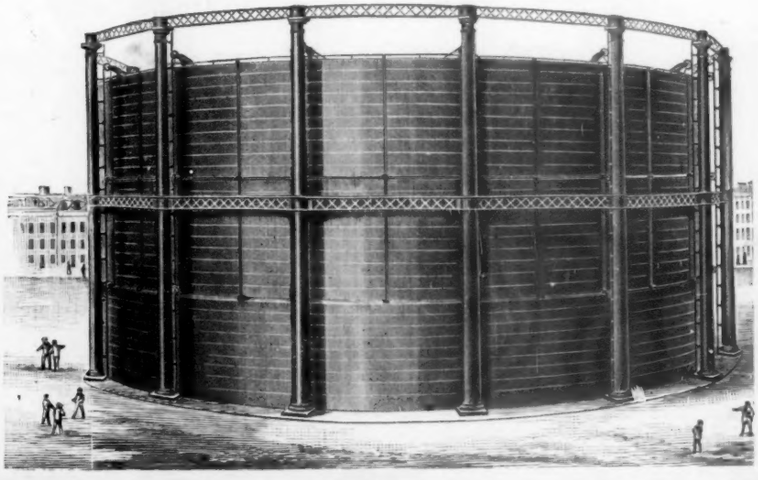

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No. 3,	"	"	250,000	"	"	"		5	"	"	" "
No. 4,	"	"	500,000	"	"	"		6	"	"	" "
No. 5,	"	"	750,000	"	"	"		7	"	"	" "
No. 6,	"	"	1,000,000	"	"	"		8	"	"	" "
No. 7,	"	"	1,250,000	"	"	"		9	"	"	" "
No. 8,	"	"	1,500,000	"	"	"		10	"	"	" "
No. 9,	"	"	2,000,000	"	"	"		12	"	"	" "
No. 10,	"	"	3,000,000	"	"	"		15	"	"	" "

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Salina Gas Light Co.	Salina, Kansas.
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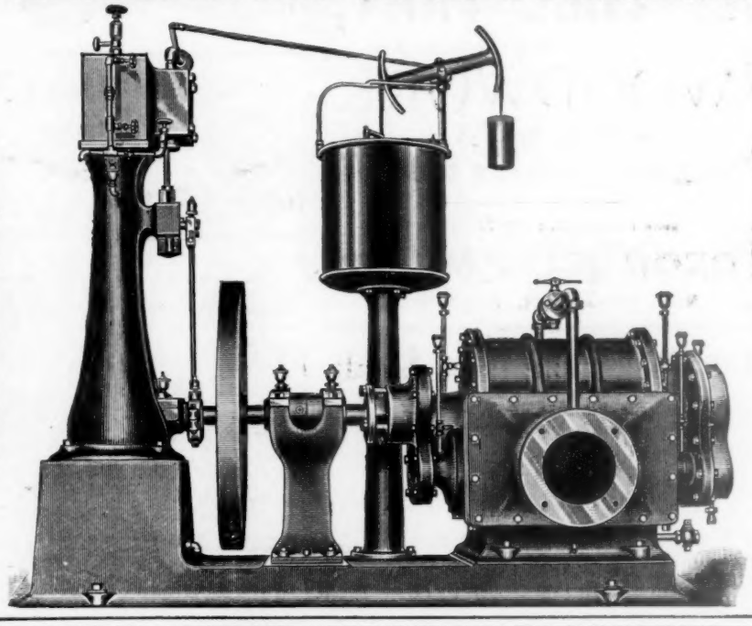

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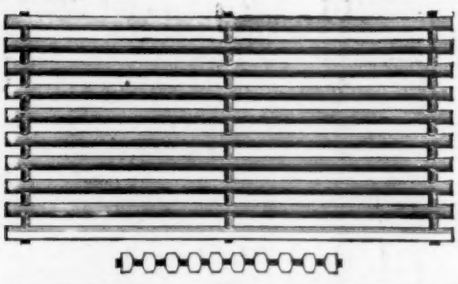

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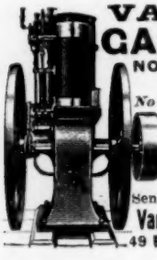

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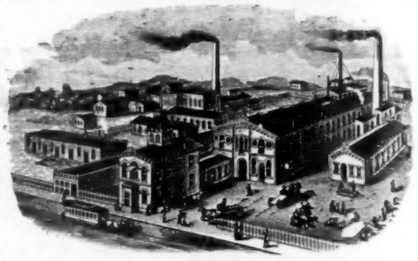

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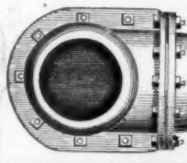

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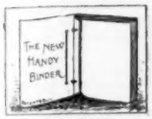

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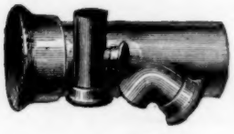

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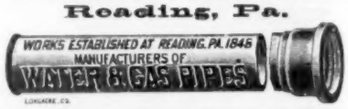

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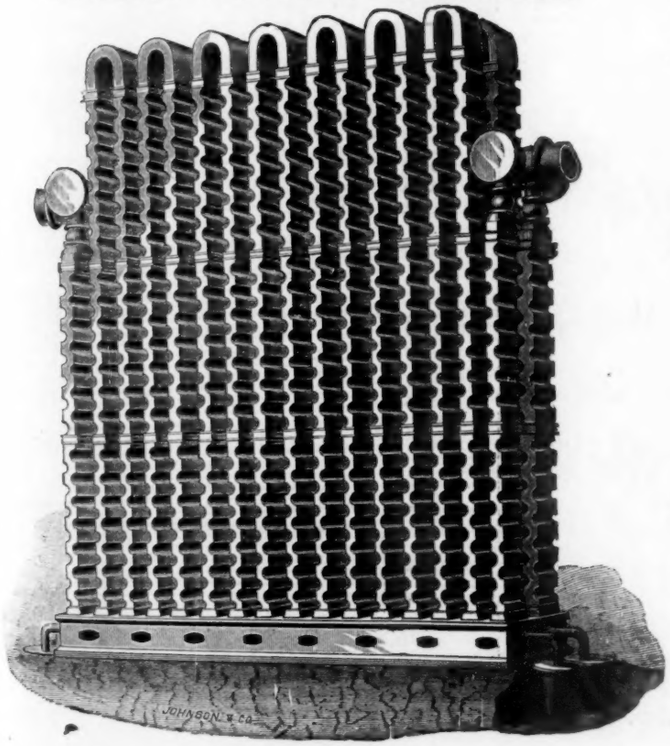

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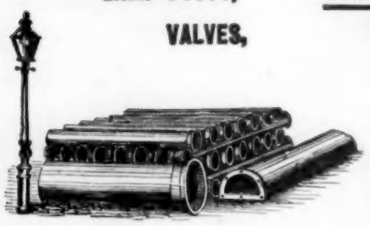

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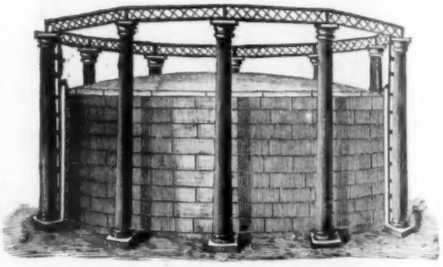

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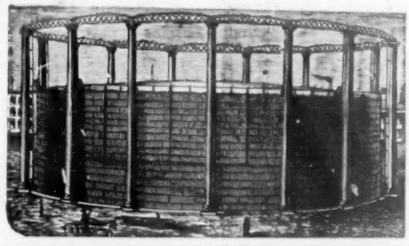
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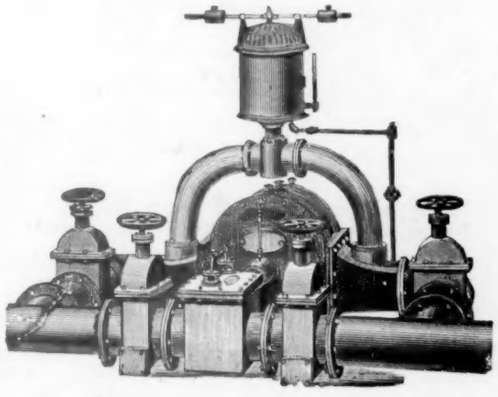
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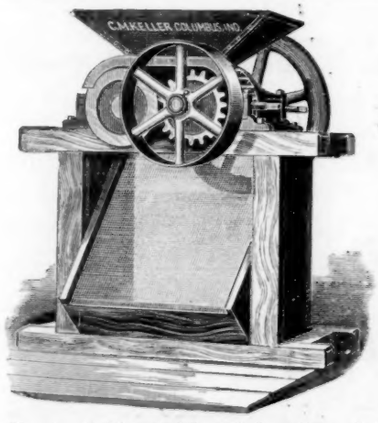

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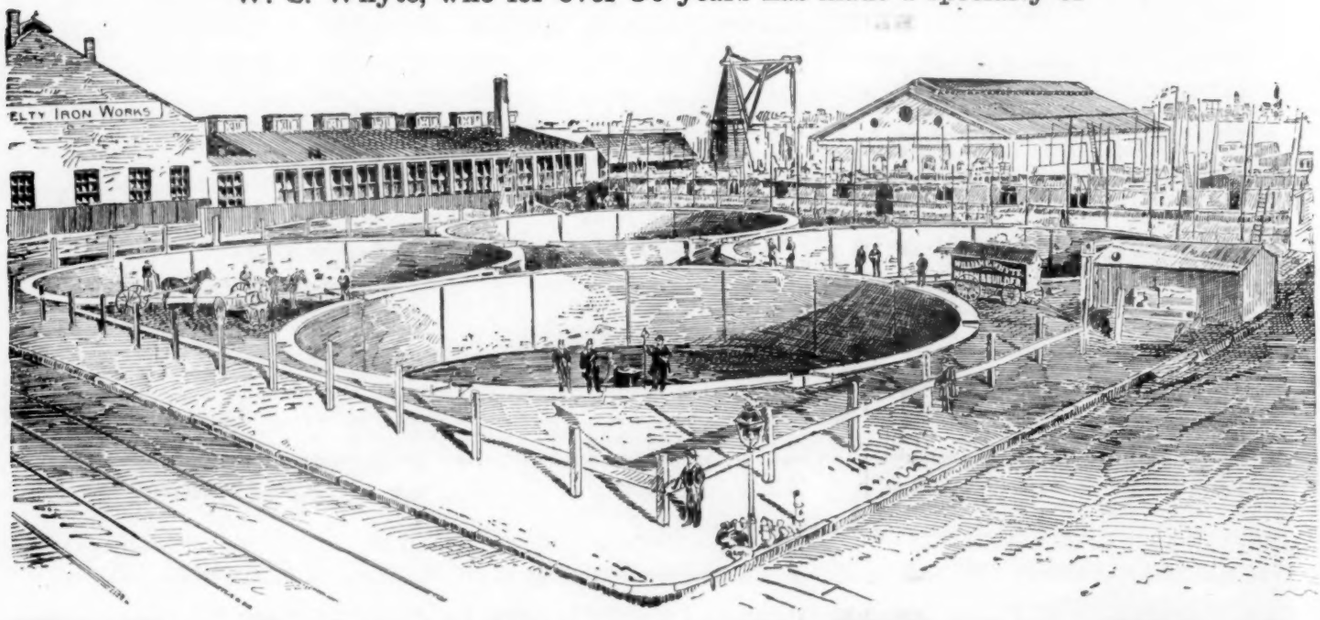

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GAS COOKING STOVE, No. 8 C.

SIZE.

Stove.	Oven.	Roaster.	Top.	Length over Extension Shelves,
37 in. high.	12 in. high.	12 in. high.	24 in. long.	36 in.
20 in. wide.	17½ in. wide.	18 in. wide.	21 in. wide.	
	12 in. deep.	13 in. deep.		

This Stove has four burners on top, and double oven burner.

Consumption of gas with all burners in use, 42 feet per hour, at 1 inch pressure.

The top is made in sections, so that a greater variety of cooking utensils may be used. By lifting out the covers and crosspieces and putting in a suitable forked ring, which is sent with each stove, a wash boiler or other large utensil may be set over two burners. Our **No. 87 GRIDDLE** also fits in the same position. The roasting oven is provided with a cast-iron door.

All Fittings are Nickel-Plated.

GAS COOKING STOVE, No. 7 B.

SIZE.

Stove.	Oven.	Roaster.	Top.	Length over Extension Shelves,
31 in. high.	9½ in. high.	10 in. high.	21 in. long.	32 in.
17 in. wide.	14½ in. wide.	15 in. wide.	16 in. wide.	
	12 in. deep.	13 in. deep.		

This Stove has three boiling burners in the Top or Hot Plate, and one single oven burner.

This cut represents our New Style Cooking Stove. As will be seen, it has an ornamented cast-iron Base and Front, and extension shelves. The Oven Burner, which is atmospheric (unless otherwise ordered), is of an entirely new and improved pattern (patent). The ovens are of greater capacity than those of the old style. The Top, in conjunction with the Outlet Pipe, is designed to carry off all the products of combustion, if desired, but they are also supplied with a loose ring which converts it into an ordinary open top stove.

The consumption of this Stove is 35 cubic feet per hour at 1 inch pressure, with all Burners in use.

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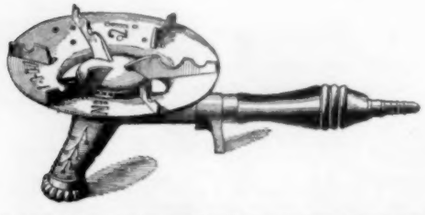

"RADIANT" BOILING STOVE, WITH REGENERATIVE BURNER.

Size, 6¼ inches diameter, 2 inches high. Consumption, 6 feet per hour at 1 in. pressure.

HOT PLATE, No. 111.

Size, 36 in. long, 12 in. wide, with three double burners, 6 taps.

Consumption, with all burners in use, 35 cubic feet per hour, with 1 in. pressure.

¾ in. supply pipe should be used where the pressure is 1 in. or over.